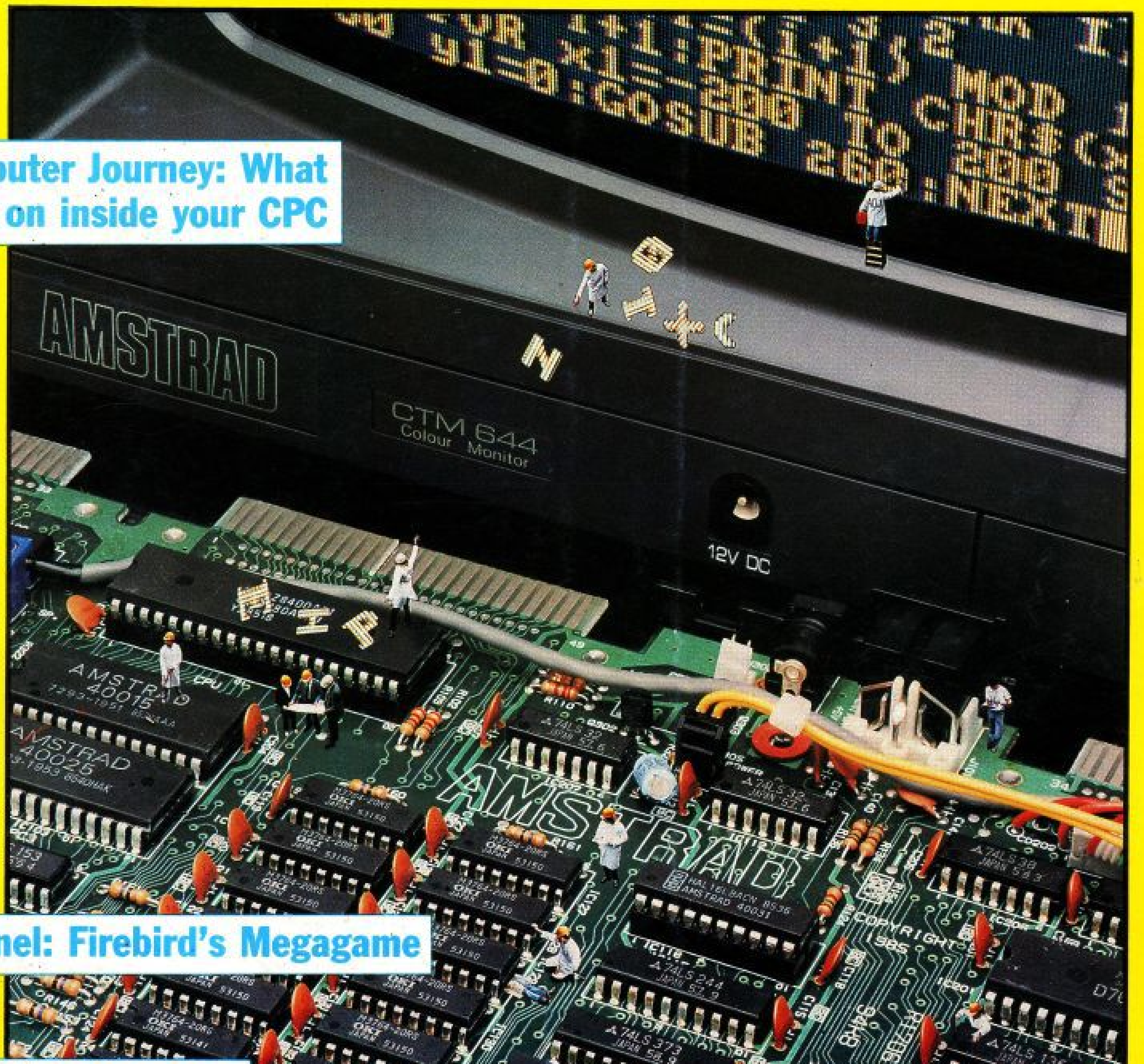
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AMSTRAD COMPUTER USER



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FOR THE AMSTRAD CPC 6128 (ALSO CPC 464/664 WITH DK 'TRONICS 64K RAM)

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MASTERFILE III is now firmly established as THE filing system for the CPC6128. It has received rapturous reviews and we could paper the walls of our new offices with our customers' letters of appreciation.

For the benefit of newcomers to the CPC machines: MASTERFILE III is a powerful and flexible data filing and retrieval system. All "database" systems require that your data is organised into fields and records. Unlike most, MASTERFILE does not commit you to field lengths or formats, since ALL data is variable-length and optional. Files are not pre-formatted, and only used bytes are saved to disc. Also, unlike the rest, MASTERFILE allows multiple user-defined ways of viewing/printing your data. And unique in its price range, MASTERFILE offers RELATIONAL FILE options, whereby common data can be entered just once and shared by many records. Maximum field size is 240, maximum fields per record is over 50, and maximum file size is 64K. Room for 1,000 full names and addresses, for example. Only one disc drive is required. It is menu-driven throughout, and comes with detailed illustrated manual, and example files.

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Summary of Business Assets

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Microcomputer, 64K RAM + 32K ROM	Amstrad	CPC 464	£199.00
Microcomputer, 128K RAM + disc	Amstrad	CPC 6128	£299.00
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Dot-matrix printer 50cps 80col	Amstrad	DMP-2000	£159.95
Executive briefcase	Antler	AT0109	£42.00
Wire paper clip	British Steel	BWC	£0.01
Answering machine	British Telecom	BT2836	£185.00
Photocopier, single-feed	Canon	PC-10	£650.00
String, ball of	IBM	DOS-Exec	£0.40
Executive jet aircraft	Lear	Cloud-Cuckoo	£5,200,000.00
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Dictation machine	Philips	510	£190.00
Coffee maker	Philips	HD5349	£30.00
Parcel scale	Salter	250P	£119.00
Microcomputer, 48K	Silicarn	Trumspec	£129.95
Letter scale	Waymaster	375KL	£10.00
Totals:			£5,202,294.26

Top record = 0001 [H] for menu

File: FILE2 Records:0016 Selected:0016 Parents:0000 RAM used:02K from 64K

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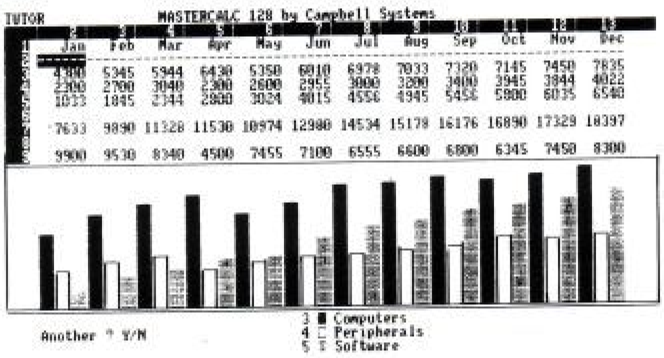
This is no toy thrown together in BASIC and half-tested, but real machine-coded computing power professionally constructed. We have had IBM and Apricot users beg us for a MASTERFILE for their machines — when they had seen the earlier CPC MASTERFILE. All this power is yours for ... **£39.95**.

For those who already have an earlier MASTERFILE, we offer updates; please telephone for details. You will be amazed at the performance improvements and extra functions.

★★★ PCW users: be patient, MASTERFILE 8000 will be ready early in 1987 ★★★

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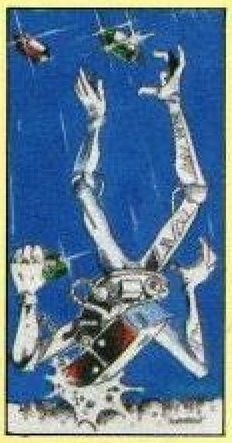
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AMSTRAD COMPUTER USER

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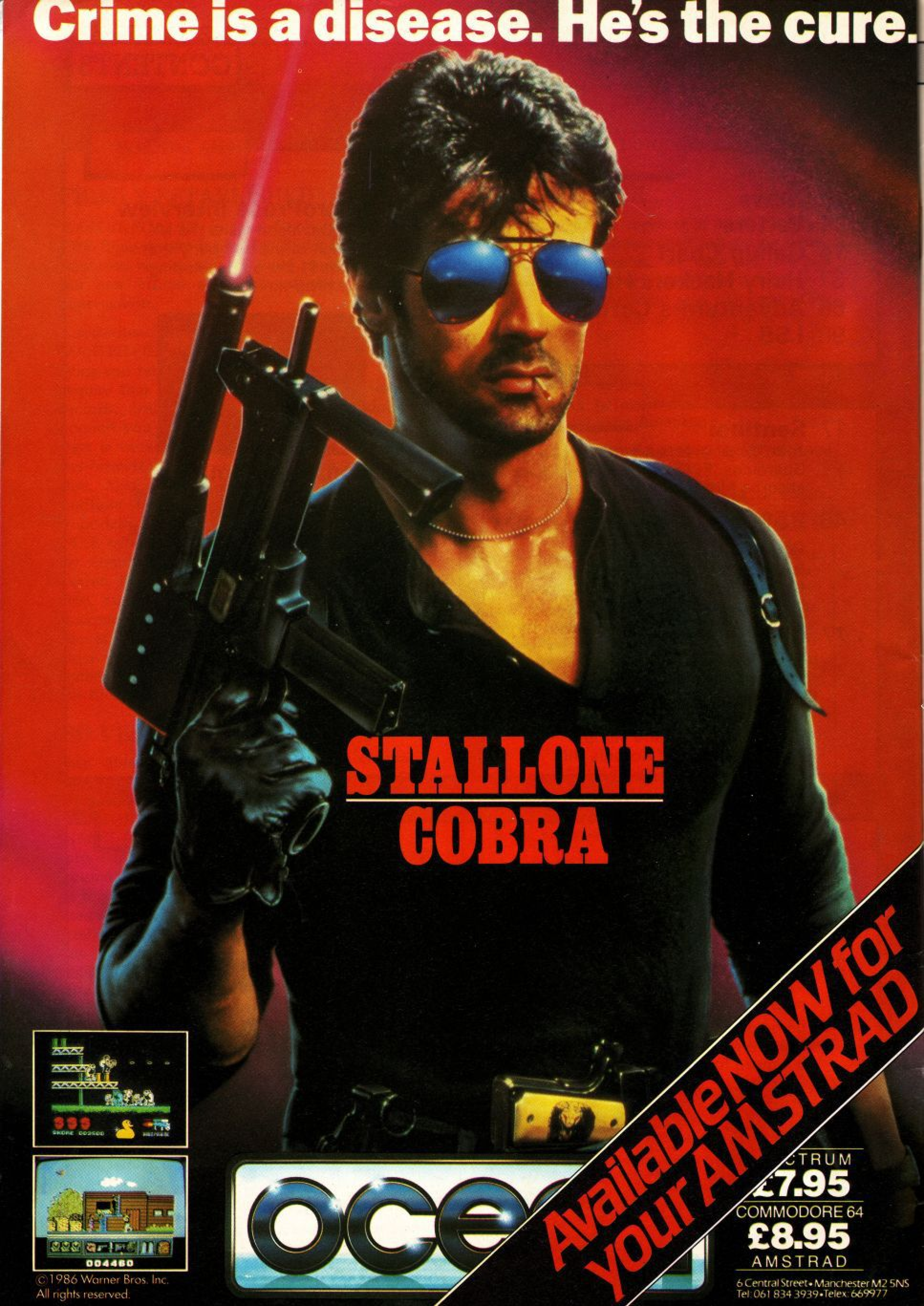
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Editorial and Advertising offices:
169 King's Road, Brentwood, Essex CM14 4EF.
Tel: 0277-234459 (Editorial); 0277 234434 (Advertising)
Telecom Gold: 72:MAG021

Published by Avralite Ltd, 36/38 St. Petersgate, Stockport SK1 1HL.

News trade distribution: Diamond-Europress Sales & Distribution Ltd, Unit 1, Burgess Road, Ivyhouse Lane, Hastings, East Sussex TN35 4NR. Tel: 0424 430422.

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The prophets were almost right

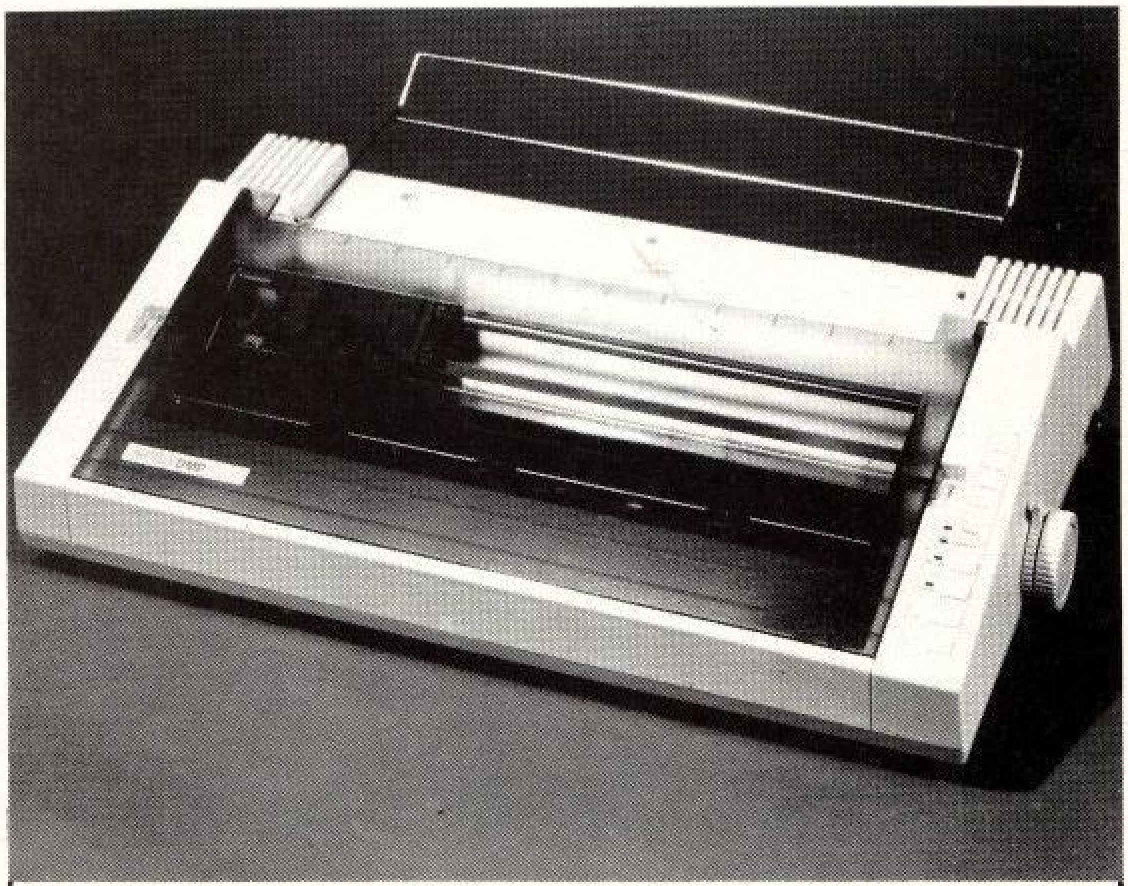
Whenever the Amstrad figures loom, the City starts to trade the shares and guess the results. Before the announcement on February 11 profit estimates were running at between £55 million and £70 million for the six months to December 31, 1986. Then Alan Sugar announced the results – a record pre-tax profit of £71.3 million. Well over twice the profits for the same period last year.

In a bullish chairman's report Alan Sugar attributed the success to steady sales of CPC computers, continued growth in PCW sales – with no sales lost to the PC-1512 as many pundits had predicted – and of course to the huge impact of the PC itself which represented 25 per cent of sales.

This is even more phenomenal when you realise that the PC 1512 was not launched until September and did not become readily available until November. With production now full steam ahead the figures should carry on looking good.

Companies often hint at what they have planned when talking to the City. Unfortunately the only mention of new computers in the report was the sentence: "Later this calendar year we will launch a host of computer and audio/video products to see us well into and beyond the next financial year."

The City reacted well to the figures and shares rose 20p, but the day before they had fallen around 10p and the day after they again fell 9p, so the actual effect was minimal. Still this left the company valued at £900,000 million pounds, with Alan Sugar owning a shade less than 46% – all on paper of course.



DMP 4000 finally available

The high speed, wide carriage printer first promised last September is now in the shops. Priced at £349, it has a print speed of 200 characters a second, is Epson and IBM compatible and uses the Centronics port.

Cheap modem for the PC

Through an exclusive deal with Pace Amstrad has released a modem for the PC 1512 at less than half the price of its direct rivals. The Amstrad PC Modem costs £149. The design is based on the Pace Linnet and shares all the same features but is built on a card which plugs into the PC 1512 expansion slots.

You get a lot for your money. The Amstrad modem will run at both 1200/75 and 300 baud full duplex allowing connection to bulletin boards and viewdata systems. It is line buffered so that machines which can only work at one baud rate at a time can talk to the modem at, say, 1200 full duplex and to the line at 1200/75.

The modem is Hayes compatible, and uses all the standard command codes implemented within the leading communications packages. There is a through connector which allows you to keep a normal telephone plugged into the line and a reset button.

Not only is the modem very cheap but it comes with a free membership to MicroLink – part of Telecom Gold – and a comprehensive communications program called DataTalk.

DataTalk runs under MS-DOS and supports a number of protocols, including VT100 and Prestel. The package represents a major threat to other modem manufacturers who would not think twice about asking over £300 for the modem, £80 for the software and £40 to join Telecom Gold.



Monty gets materialistic

Monty Mole doesn't live in a hole, he wants an island to call home. The island in question is Montos, but to buy the place calls for a lota loot. In Gremlin Graphics' new game Auf Widersehen Monty you have to make the money as you travel the world.

Two useful newies from Arnor

Arnor ventured into the Amstrad world with Maxam, a rom-based assembler for the 464. Now it is to release the much heralded successor Maxam II. This is an improved but different assembler. It is not designed to replace Maxam, but is aimed at serious programmers. Unlike its forebear, Maxam II is not rom-based. It doesn't even run on a 464, being a CP/M plus program it requires a CPC 6128 or PCW.

The Assembler now includes full macros, a posh editor based on the prog mode in CP/M Porotext and a wizzo new monitor and debugger. This offers a full front panel, single stepping and breakpoints.

There are conditional breakpoints and if you have the symbol table saved from assembly (you wouldn't go around disassembling other people's programs would you?) you can even set a breakpoint at a place in the program where a label used to be before assembly – clever huh?

Further neat use of the symbol table eliminates the need for a linker, just assemble the sub-routines one after another and the symbols get tacked on to the end. Maxam II will be reviewed shortly, it sounds good but then good doesn't come cheap at £79.95.

Arnor's C is a full Kernigan and Ritchie optimising compiler. It produces very fast intermediate code and has the same Protext-sired editor as Maxam II. There is a linker included which allows you to mix C and assembler. Also priced at £79.95 Arnor C is available now. For more details contact Arnor on 01-684-8009.



Tune in to the weather

A software breakthrough means that all CPC users can now see what Britain's weather looks like from outer space. With their machines they can tune into a weather satellite and receive the same information that enables the men from the Met Office to predict sunshine or showers.

All this is possible with WeatherLink, the exclusive service on MicroLink, the UK's national on-line database. For this provides the key to an astronaut's view of weather patterns developing over the UK.

Using a monitoring station based in Kent, WeatherLink intercepts signals from the NOAA9 satellite and converts them into electronic data. The receiving aerial locks on to the satellite every time it appears on the horizon and follows it until it disappears from view some 15 minutes later. The same sequence is followed on average four times a day.

Live pictures produced by NOAA9 hovering 450 miles overhead – it takes two at a time, one in visible light, the other infra red – clearly show that part of the world from North Africa, through Europe and Great Britain up to Iceland. The pictures are recorded on computers at the tracking station. A converter then takes the image and readies it for transmission over standard telephone lines to the main MicroLink computer. Once a MicroLink subscriber logs on, all he needs to do is download the information.

To achieve this the user requires specially written software on the MicroLink menu, the CPC version of which has only just become available.

The machine code program to display the files is now ready for downloading from the system. In addition there is a convert routine to place expanded Ascii files into a form the CPC will understand.

Once both programs have been downloaded the user is ready to receive the latest pictures from outer space.

Text and pics on the PC1512

One of the world's leading database houses has launched a revolutionary easy-to-use package for the PC1512.

Precision Software of Surrey selected The Which? Computer Show to unveil its Superbase Personal priced at £99 on the Amstrad stand. A multi-file relational database designed specifically to make the most of the Gem environment, it offers a facility for mixing pictures and text.

The graphics management capability allows pictures to be retrieved and displayed, and there is even a built-in automatic slide show picture sequence.

Developed as a "very visual" data management system, there is no limit placed on the number of fields, nor on the size of the record.

It incorporates all the latest user-friendly techniques such as windows and pull-down menus. Data manipulation is achieved by the click of a mouse on video recorder style symbols on screen.

File structures can be changed at any time without disturbing existing records and there is a specially-designed label printing feature.

However this is Precision's first product for the Amstrad range having made its name primarily in the Commodore market. "We are well aware of the importance of Amstrad in the micro scene today", says Nigel Lovett-Turner, Precision's sales director.

"That is why we have devoted considerable time and money to develop this package specifically for the PC1512".

Who won what . . .

The Ariolasoft goodybag and T Shirts went to: S.Thomson of Chipping Norton, Paul Joesbury of Walsall, Matthew Matten of Hastings, Graham Potts of Bradford, Nicky Cutts of Bransley, L.J. Coughtrey of Lancaster, O. Cunningham of West Lothian, Gareth Ede of York, Oliver Vidovic of Yugoslavia, Martin McLees of Glasgow, E.R. Edwards of Birmingham, C.D. Cook of Reigate, J. Makamoolally of Mersyside, Julian Cater of East Sheen, Deanna White of Fleet, D. Mulcahy of South Wirral, Neil Galbraith of Ayrshire, M.A. Smithers of Surrey, Mr Koppelow of St. Austell, Haran Siva of Wimbledon, S.C. Leak of Bristol, and Kevin Beddow of Lichfield.

Dan Dare book and limited edition T Shirts were won by: Jason Murray of Derby, M.J. Dainton of Cheltenham, M.A. Williamson of Cheshire, R.P. Hudson of Stockbridge and Gary Harrigan of Telford.

The winners of the Level 9 Calendar compo were: Darren Podd, S.C. Leak, K.R. Dyson, D. Pye, Kevin Beddon, S.M. Bezer, Semin Malde, Richard Fairley, G. Minto, S.R. Chandler, N. Edmunds, David Mrauroadid, J. Uneworth, L.J. Coughtrey, M. Cluer, B. Bateman, G. Magee, Dean Bubley, Terry Weaver, J. Cater, William Freelnd, K.E. Hankin, Michael Bird, L. Townsend, H. Siva, Lee TR, Neil Webster, David Chan, John Thompson, Leif Christensen, R.A. Ellis, Harry Parren, Graham Shaw, Andrew Duff, Sam Meldrum, G. White, Peter Featherstone, Russell Fletcher, P.Newman, Mary Pockert, D.Cunningham, John Bell, Gavin Lennon, Michael Massos, Antony Perkins, Lynsey Learoyd, N. Bell, Mark Hagger, M. Barrett and Barry Newell.

The wonderful Citizen MSP-10E printer was won by Shane Dillon of Farnborough. ACU

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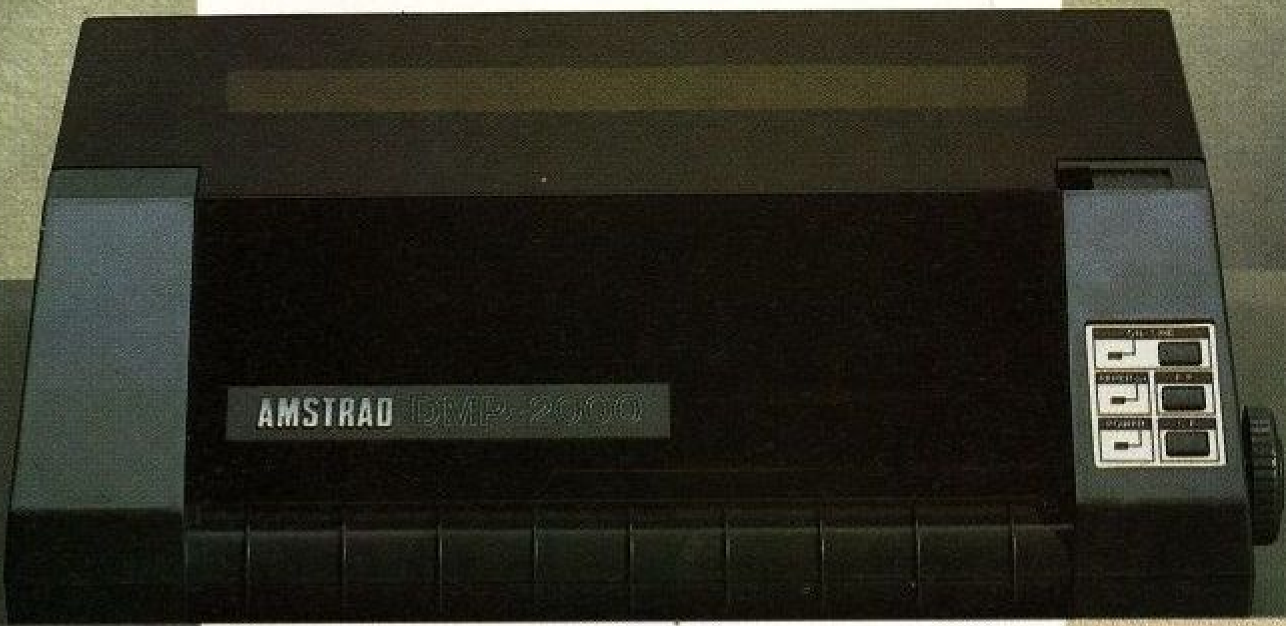
Just add a printer (and the necessary software) and your computer becomes a word processor. And you become a very efficient secretary.

If the printer you add is the Amstrad DMP 2000 your efficiency will even extend to saving quite a lot of money.

Because the DMP 2000 costs just £159 (incl. VAT).

Yet it will print draft quality text at an impressive 105 characters per second. And Near Letter Quality at 26 characters per second.

As you would expect it is compatible with all Amstrad home computers. But it is also compatible with Epson and any other make that has the same Centronics Parallel Interface.



If you've already graduated to a PC there's the Amstrad DMP 3000 printer.

It's compatible with all the Amstrad PC 1512's as well as Epson and all other IBM compatible PC's. It costs just £169 (plus VAT).

Both printers have easy front loading and both will take ordinary A4 paper. One of them is bound to be right for your particular home office.



Please send me further information on the DMP 2000 ☐ and DMP 3000 ☐ ACU 4.87

Name____________

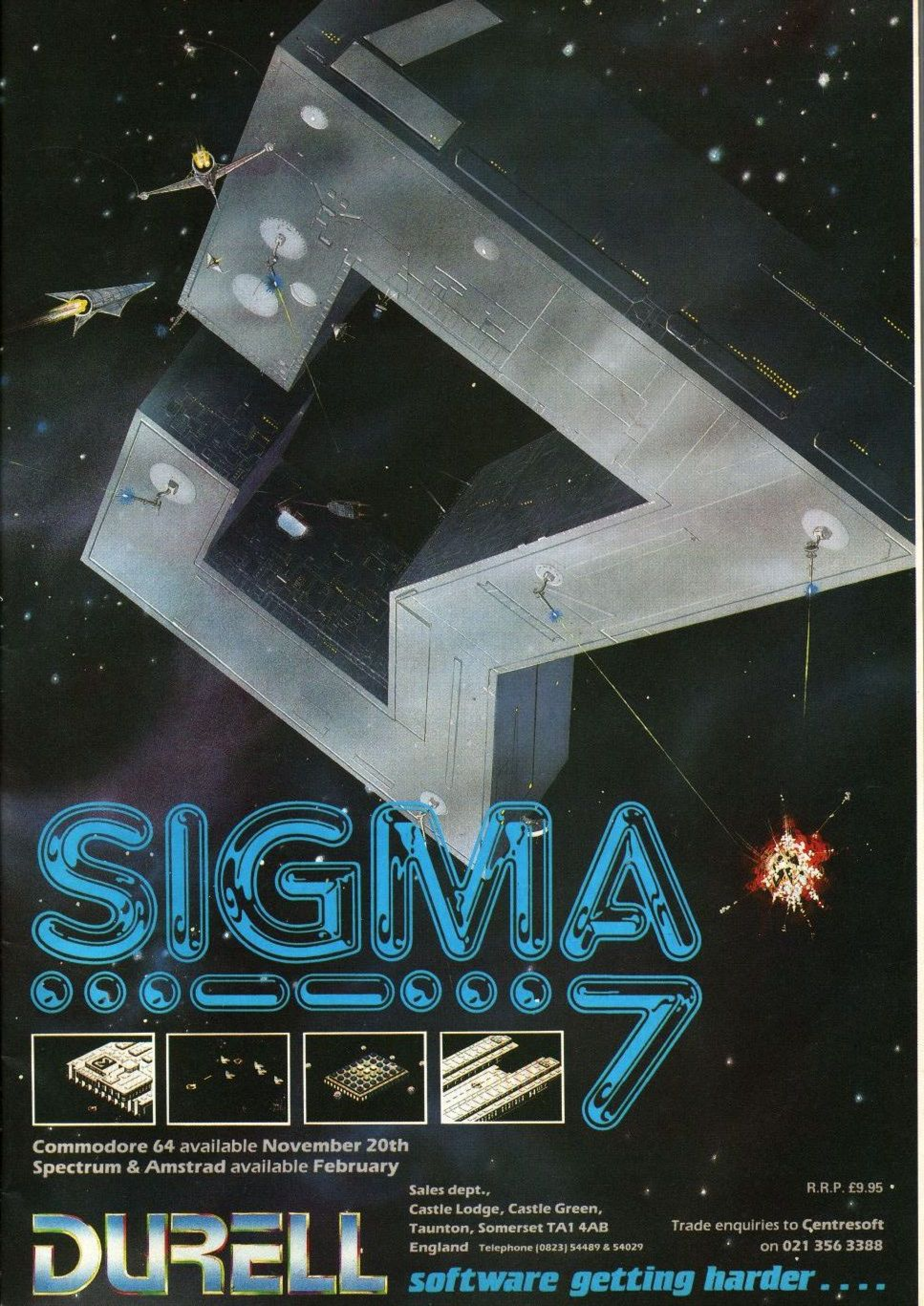
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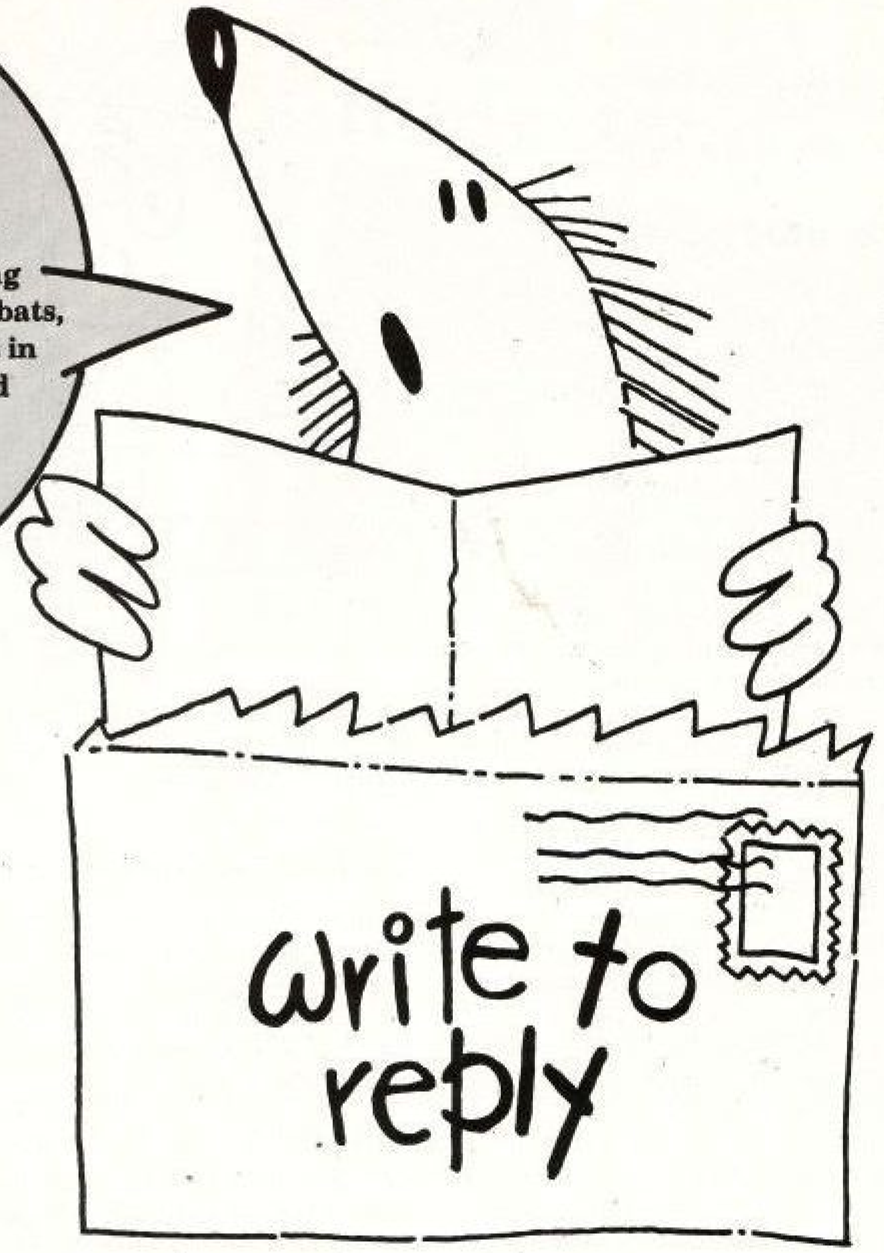
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Hi, I'm Lance Davis, your letters editor. If there is anything you think Amstrad computer users ought to know about then drop me a line. I can't deal with individual problems and this isn't really the place for programming tuition but it is the place for bouquets and brickbats, views and opinions. Write to me at the address in the front of the magazine or on Telecom Gold System 72:mag012. Remember that some writers will be sent free software, so let me know which computer you have.



Going spare

My son and I are at the end of our tethers. His CPC 464 has not been loading for five months. I have spent pounds on phone calls all over the country to no avail.

We were told to go to Curry's, Rumbelows, Dixons. Nobody wants to know. We have tried local dealers and they say they can't get the spares. I'm writing to you as the last resort.

Distressed,
Somerset.

LD: *Arnold cassette decks do wear out but the spares situation is now very healthy. The service people at Amstrad reccomend that you take your machine to the local Comet shop.*

PC price increase

I purchased a single-drive 1512 from Lasky's on January 3 and they charged me 12.5% over the advertised price. They told me that the price was increased on January 1.

As I understand it Amstrad increased the prices on that date but retailers should have continued to sell their existing stocks at the original price and only implemented the increase on deliveries from Amstrad after January 1.

Can you confirm if I have my facts right and if so advise me on how to go about getting Lasky's to refund the overcharge.

John Donaldson,
Hampstead Financial Services,
London.

LD: *The laws of the land prohibit price fixing. This means that Amstrad has no right to say what price the retailer must charge – the prices quoted in the advertisement are recommended retail prices.*

This is not just the case for computers, it's true of everything from a tin of baked beans to a Lamborghini. So if Lasky's want to make a loss and charge you a fiver for a PC1512 or they want to rob you blind and charge ten grand for the same machine there is nothing to stop them.

Looking around a number of shops in Central London at the beginning of January I found that the only people who kept to the old prices were the shady discount stores. I wouldn't attempt to go for a refund.

War of words

This letter should put the cat amongst the pigeons for those of you who wish to give support to your favourite WP, and is in answer to M.Catton of Gosport (*ACU* February 1987).

Why does LD say Protext is the best without qualification? ACU hasn't tested Tasword 6128 yet.

Having lived with Tasword and used Protext occasionally, I would like to give you my comparison between Tasword 6128 and Protext.

Protext's main advantages are its speed (it's fast) and ability to give a 40 column mode. Of course with an eprom you can have an instant LOAD. A split screen giving a command mode is a nice touch although to change screen colour and so on it is really necessary to modify the Basic.

Tasword is in my opinion the professional processor with comprehensive on-screen help if required. It gives an automatic CAT on LOAD or SAVE and is more menu driven. An automatic word count is given, plus many extras.

And with a TUTOR+READ ME to help you through the program, it is very rare that the instructions are required. While the program is loading you type ahead for Loading/Merge menu. Of course the extra 64k is used as well.

Both are very good WPs. Tasword 6128 (Tasman) has thought of everything and is very refined, but if its speed you want then its got to be Protext (Arnor).

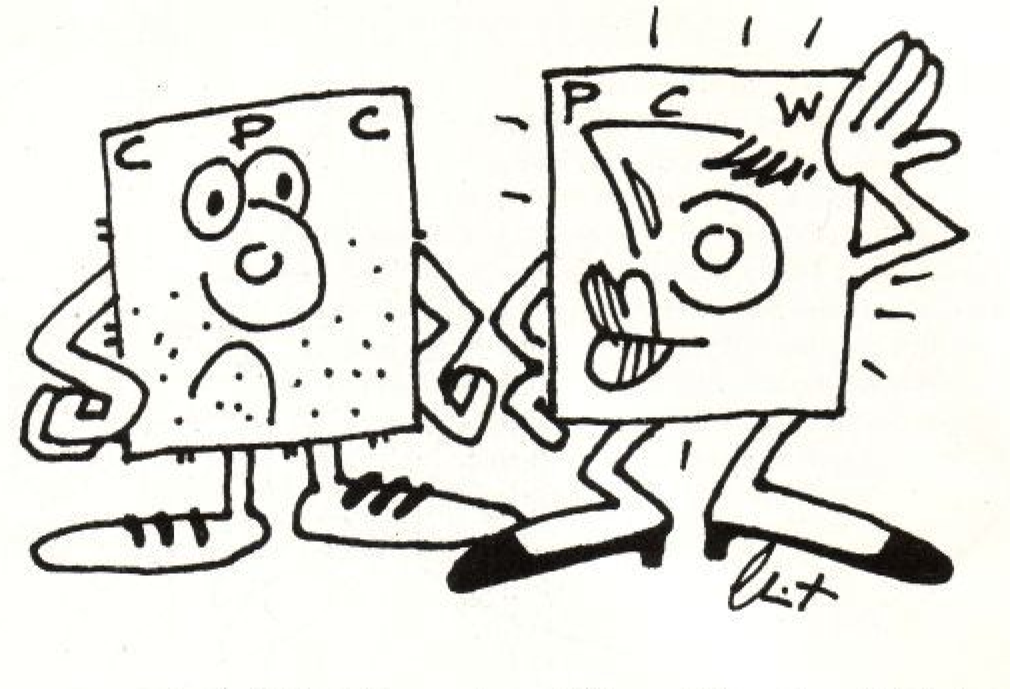
Sorry – I think Tasword 6128 is better, by a smidgen.

Len Philips,
S. Wales.

LD: *Wordprocessors are always a matter of taste. ACU may not have reviewed Tasword 6128 but I've had a play with it.*

Perhaps it is my familiarity with Protext which makes me prefer the

Arnor product: I would still argue that Tasword is easier to get into but the speed of Protext merits the extra effort.



Which machine?

Just over a year ago my wife and I invested in an Amstrad Computer. I favoured a CPC 6128 because of its general versatility and because I was mainly interested in programming and colour picture layups. My wife prefered a PCW 8256 because she wanted it exclusively as a word processor. Naturally she won. When I could get at it I wrote a number of fairly extensive business programs which only occasionally require the use of the printer. The use we both make of the computer has now increased to a point where I am having to consider buying a second one since I frequently can't get at the first one.

My problem is which one to get. Could you please tell me if there is any way that I could run programs written for the PCW 8256 on the CPC 6128 or any other model with a greater general versatility and ideally a colour facility. Also would it be possible to use a program such as LocoScript on such a computer, store letters on the disc, then print them off on the PCW8256 when I can get to it!

Arthur Smith,
Caerphilly.

LD: *If you buy a PCW there will be no extra outlay, you can go for a 6128 but will have to buy some extras. Mallard Basic for the 6128 is available from Locomotive software for £100, they are on (0306) 887902. However this is a CP/M program and does not offer simple use of graphics and colour. You cannot use LocoScript but you could get CP/M Protext, this would work on both the 6128 and the PCW. It costs £80 and is available from Arnor who are on 01 684 8009.*

Dotty dictionary

After reading the Hairy Hacker computer term definitions I thought I would send in some of my own:

LIVE PARTS INSIDE: Don't come near me with that screwdriver!

PASCAL: Ancient Greek philosopher

COBOL: Pascal's brother

FILE NOT ON DISK: I've got better things to do with my time than searching through blank discs.

UNKNOWN USER FUNCTION: What the heck are you doing?

INSUFFICIENT ACCESS: Get lost!

Dexter's ski cap,
Southport.

LD: *Well Mr Cap, an interesting collection. I like the letter Amstrad received from someone who had "Type Mismatch in 30" complaining that when he typed 30 MISMATCH, he got a syntax error.*

Colour creator

I am writing to you for some information. Being the proud owner of an Amstrad CPC464 with the green tube monitor, I seem to be missing out on the vast range of colours that my Amstrad has to offer.

Robert Stebbings,
W.Midlands.

LD: *Try this: Go into your local computer shop and say "Please can I have an MP-2 for my Amstrad". The spotty kid in the shop will disappear around the back and before you can say "Roland goes digging" he will reappear clutching a brown cardboard box. Then he will charge you £29.95. There have been supply problems but these are now all sorted out.*

Old space

I'm not really one for the computer games – actually I find most of them too dificult to follow!

However, there is one game I would like to play and that is good old-fashioned Space Invaders (remember the arcade game?).

Is there software still available for this (if there ever was) and if so, where can I get a tape from?

Mrs J.Wood,
Rochdale.

LD: *Bubble Bus (0732 355962) produces Classic Invaders: a good software shop should have it in stock or be able to get you a copy.*

Upgrade available

In your ever splendid magazine, people keep asking about upgrading their 464 or 664 to a 6128. You keep telling those people that the roms of the 464 and the 6128 are different, and that the extra memory isn't easy to fit. Maybe I have a suggestion: If an Arnold can use 240 roms plugged into the back of it, why can't you sell the rom of the 6128 as a sideways rom for the 464? And if you make an exclusive contract with someone like DK'Tronics, you could sell it as a package.

With this way of upgrading, people who don't want to sell their 464 or who don't have enough money to buy a 6128, can still use the splendid facilities of a 6128. After all, cassette based software is cheaper, but for serious applications, 64k is a little short.

And for someone with a DDI-1 fitted, CP/M plus, with more facilities, is also something to desire.

Now something else: I bought Amsword some years ago and as I would like to use much larger text files, I wonder if this program can drive a DK'Tronics memory expansion? Or should I buy Tasword 6128?

I also would like to know if this program is different to Amsword, because my mum just got used to it!

Klaas Decanniere,
Belgium.

LD: *You can buy the 6128 rom (part number 40025) from CPC who are on 0772 555034. This will turn a 464 with DK'Tronics RAM pack into a 6128. To use it you must remove the old rom – you cannot just plug the new one into the back.*

Digital Research and DK'Tronics cannot agree on a price for CP/M plus and so it is unlikely that it will be made available.

Copying a friend's CP/M Plus disc is illegal so while a suitably upgraded CPC will run things which are usually 6128 only – such as Rainbird's Art Studio – you cannot use CP/M Plus.

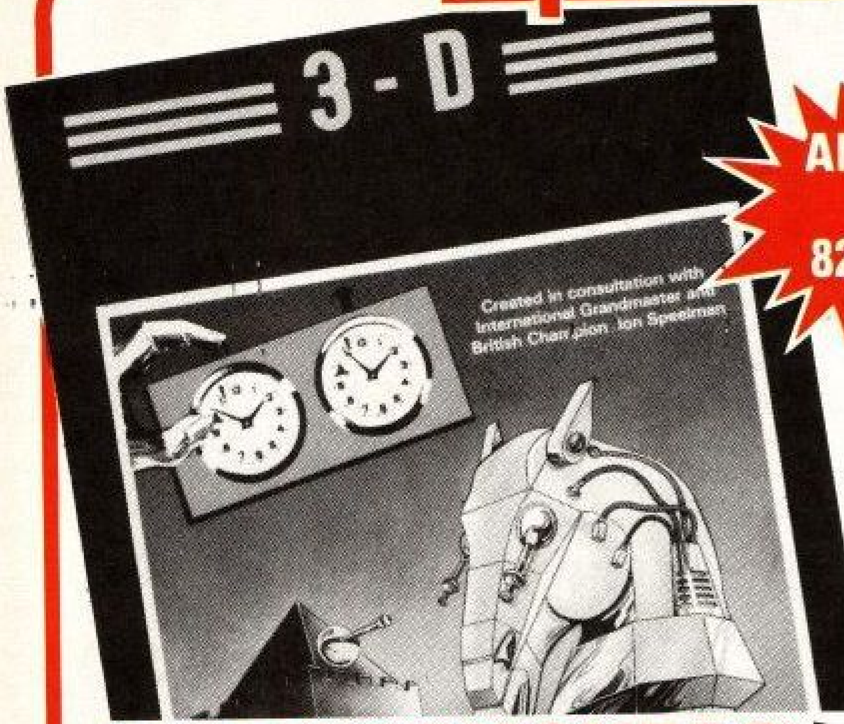
If you are used to Amsword then Tasword 6128 is your best bet.

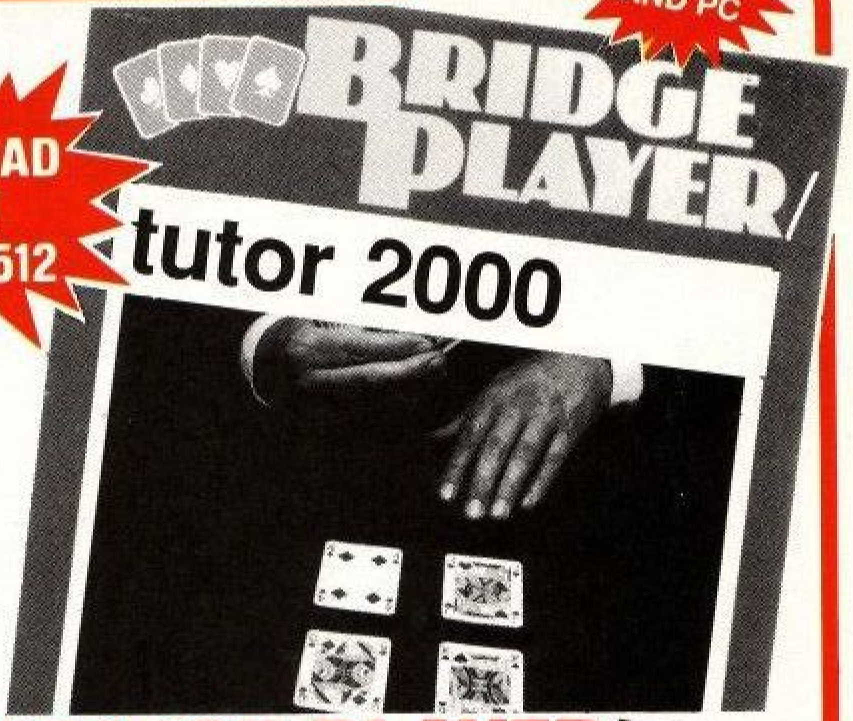
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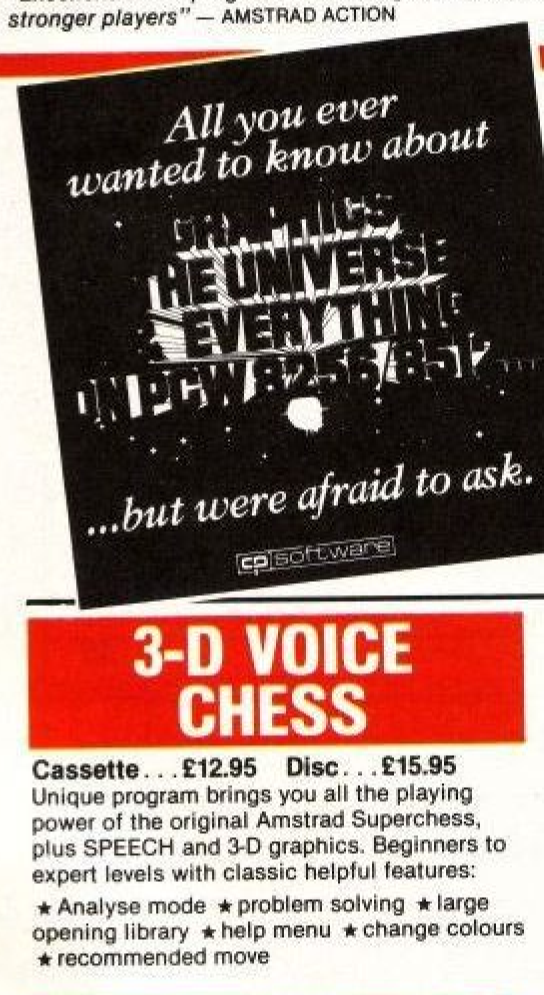
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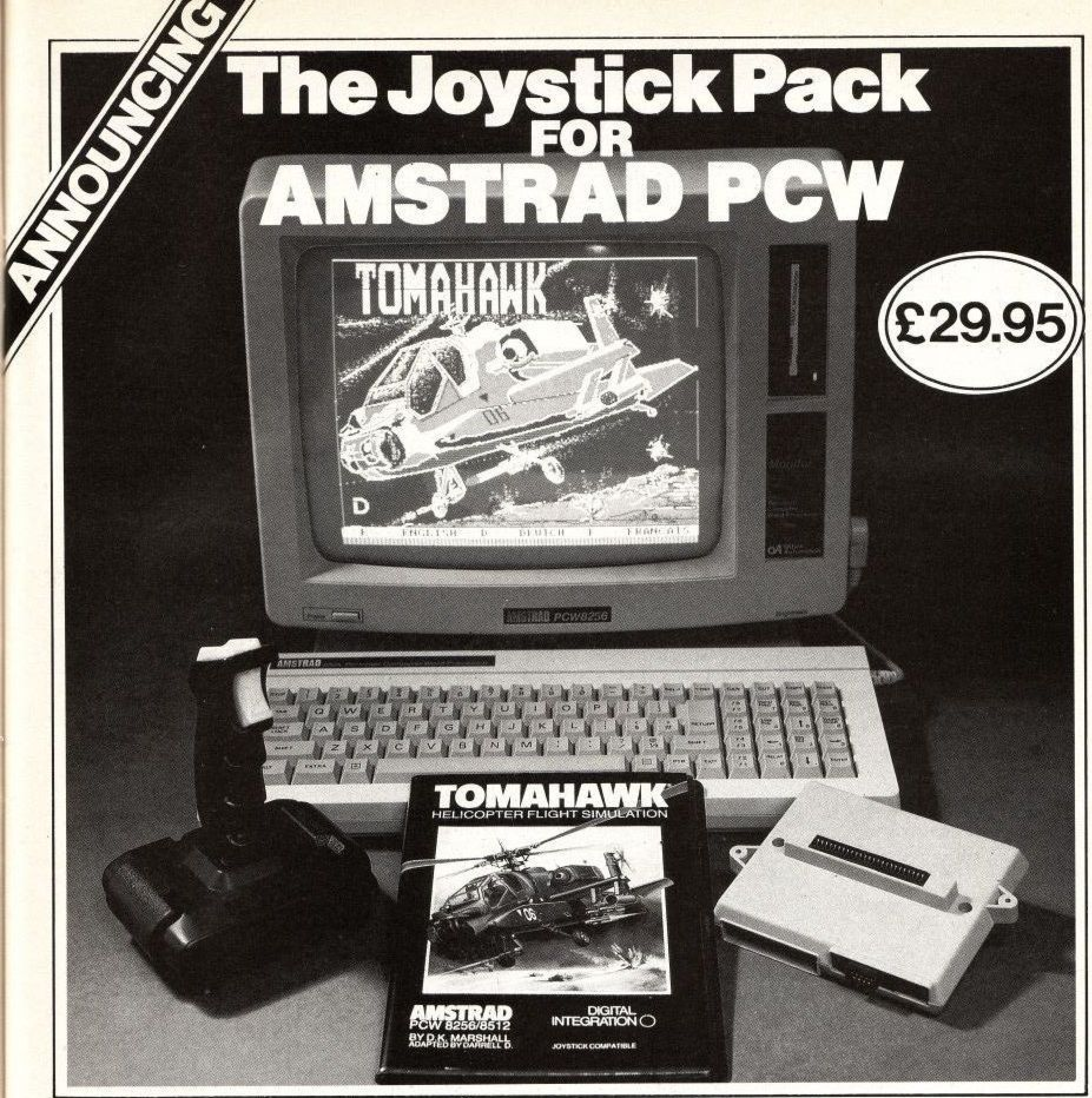
GALLUP SOFTWARE CHART

Pos	Move	Title	Comment	Last month	Market strength
1	Non-mover	**Gauntlet** *US Gold*	Excellent conversion of the multi-player arcade smash. Impressive use of the sixteen colour mode and high speed animation. Deserves to be number one.	1	100
2	Up	**180** *Mastertronic*	Digital darts, a budget game based on the non-intoxicating bar-room skill.	9	86
3	Non-mover	**Konami's Coin Op Hits** *Imagine*	Save all your pennies for some day by avoiding the arcade and playing Green Beret, Ping-Pong, Hyper-sports, Mike and Yie Ar Kung-Fu at home.	3	84
4	Down	**Computer Hits 10 Vol. 3** *Beau Jolly*	All your fave raves on one tape. A bargain compilation from the various artists of the computer industry.	2	67
5	Up	**Five-a-Side Soccer** *Mastertronic*	Football games have been around since the days of Pong, now a cheapie for the CPC keeps the trend alive.	11	63
6	New entry	**Donkey Kong** *Ocean*	One from the vaults. Save your girl from a gorilla in the game which was the arcade hit of yesteryear. Odd actually, a Kong game for the 64 was one of Oceans early titles.	ne	62
7	Down	**Five Star Games** *Beau-Jolly*	Good bargain compilation as seen on TV. Ideal first buy for the new computer user. Worth £9.95 for Spindizzy alone.	5	60
8	Down	**Space Harrier** *Elite*	Ace Amstrad version of the Sega arcade buster. When the real thing costs up to 50p a throw this game looks super cheap but plays like nothing you've seen.	7	59
9	Down	**Trivial Pursuit** *Domark*	Quirky questions and polished presentation give you as many endless hours of fun as the board game. Also available for the PC and PCW.	4	57
10	Down	**Hit Pack** *Elite*	Compilation of games for the price of one, oldies but goldies, still with a plethora of compilations you can pick and choose.	6	54
11	New entry	**Ninja** *Mastertronic*	The fist fiends fight on, this time with a more vicious trait and at a lower price. You have to fight off the many using a variety of weapons. A bit like Kung Fu Master.	ne	53
12	New entry	**XCEL** *Mastertronic*	An ex-Activision, now priced as only Mastertronic know how. A 2D shoot-em-up with a dash of trading and puzzle solving for added spice.	ne	51
13	Down	**1942** *Elite*	Jap-bashing Double U Double U Two fighter game, a sort of historic Xevious with aircraft carriers.	9	46
14	Down	**Booty** *Firebird*	A golden oldie on the Speccy but new to the Amstrad, pirates and treasure platforms game.	12	45
15	Non-mover	**Breakthru** *Data East/US Gold*	Possibly the worst game ever from US Gold. The collision detection in this game is so far off you get hit by bullets a character square away and can drive over rocks unharmed. Avoid.	15	43
16	Up	**They Sold A Million (3)** *Hit Squad*	Fighter Pilot, Kung Fu Master, Rambo and Ghostbusters go to make up this compilation of past classics.	17	36
17	Up	**Mini Office II** *Database*	A full suite of business software at a low, low price. Ideal first look at sensible software but lacks the power for major applications.	re	35
18	Up	**Footballer of the Year** *Gremlin Graphics*	Deep thought is needed in the football futures game from Gremlin. Has the added bonus of good graphics.	20	34
19	Down	**Top Gun** *Ocean*	Two player dog fighting. High speed wire frame graphics – move over Tom Cruise.	10	32
20	New entry	**Konamis Golf** *Imagine*	Top-hole action on the green from the land where they love to play a round.	ne	32

Non-mover · Up · Down · New entry

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Chart compiled by Gallup/MicroScope



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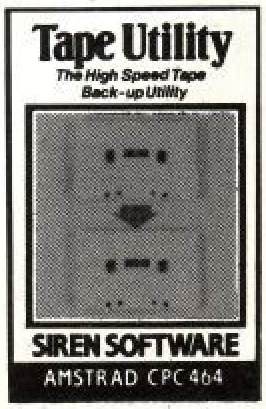
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Land of Confusion

John Baker ventures into a nightmare world of boulders, trees, guardians, meanies and . . . The Sentinel

When someone phones up and asks you to review a game with 10,000 levels a vague feeling of despair starts creeping in. Not another mega huge platforms and ladders job, surely? Or worse still, a 15-part multi loader called something like Quest for the Sacred Keys of Tharg, in which you play the mighty hero Norman, on whose equally mighty shoulders rests the entire fate of Pixiedom,and so on, and so on.

Worse still when they tell you it's a "totally new concept in gamesplay .. completely new . . . absolutely original".

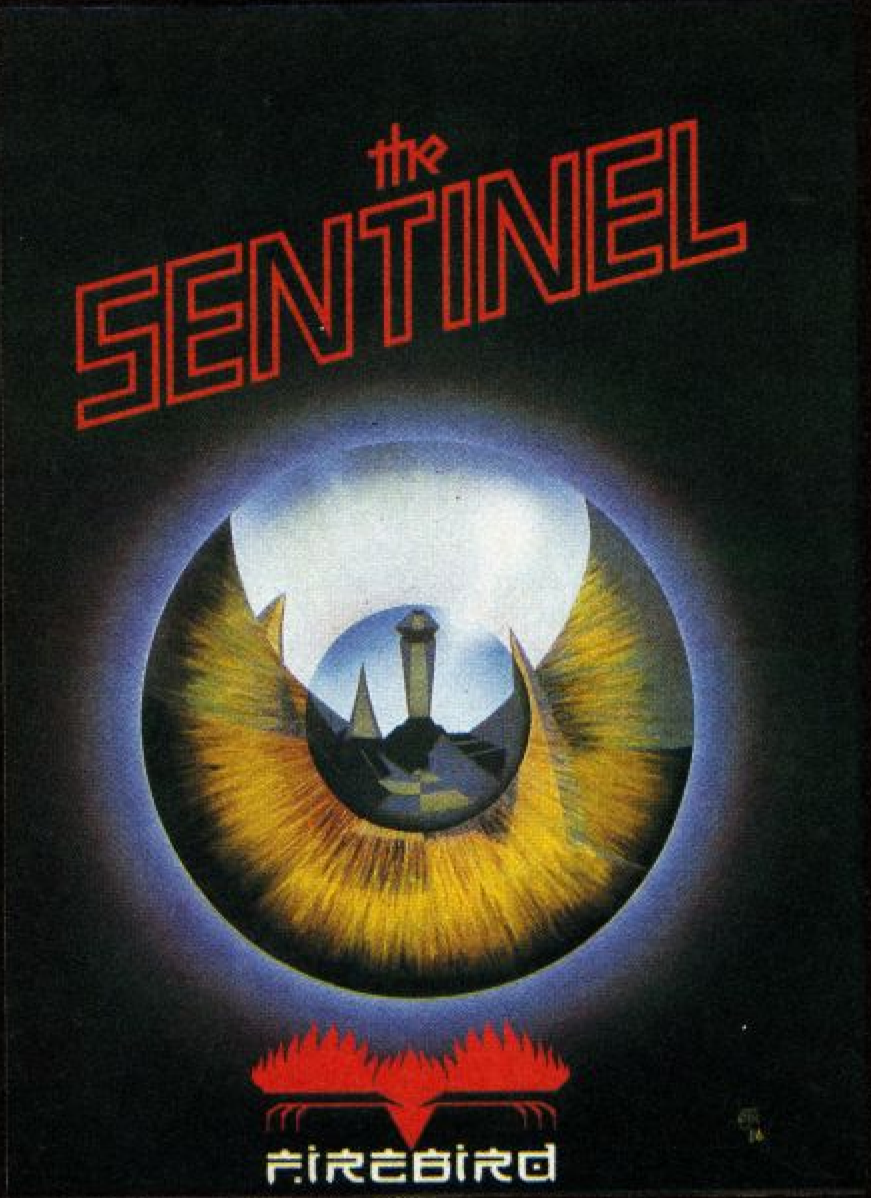
Instinctively reaching for the Valium, suddenly unexpected hope springs forth when you hear the name of the author, Geoff Crammond. And when you actually get to play the game you sit there completely dumbfounded, because for once all the hype is true. That game is called Sentinel.

Let's get a few things down for the record. Sentinel is a totally new concept in gamesplay. Sentinel is also completely new. Astoundingly, it can also be described as absolutely original. And Geoff Crammond is the nearest thing the British games market has got to a genius.

Geoff made his name writing Aviator, a flight simulator for the BBC B, generally accepted as being the best on that format, but came to prominence only after the release of Revs on BBC B, then Commodore 64.

A motor racing simulator par excellence, Revs confirmed Geoff as a major programming talent and a master of the 6502. And then came Sentinel.

Originally released on the BBC B, quickly followed by the 64 version, it stunned the punters, picking up a host of awards. Now it's available on the CPC and it may not be bigger (you really want more than 10,000 levels?) but the good news is that it's better than ever before.



The concept

Sentinel is primarily a game of energy that pits you, an intelligence forced to dwell within robots of your own creation, in mortal combat with the Master of the Landscape, the Sentinel, standing on the highest point of the abstract Marble Madness style landscape where you find yourself imprisoned.

Geoff's strong science background comes out here. You expend energy to create objects, you gain energy by absorbing them. Robots, in which you can project your being at will, cost three units.

Boulders, which you can build in stacks – one of the primary strategies of the game – costs two. The lowest unit of energy is the tree, costing one unit. You start the game with ten.

The rules are quite simple. You can absorb the energy of any object you can see the base of, and to do that, you must be higher.

Creation is very much the same. You move around the landscape by creating a new robot, then transferring your "self" into it – the simple matter of pressing a button. You now see through its eyes.

To win the duel, you must absorb the Sentinel himself. This might sound easy but it's not, because the Sentinel has a deadly gaze.

As it rotates on a lofty pedestal its gaze scours the landscape like an invisible lighthouse, and if you are caught in that searchlight you are slowly drained of energy, unit by unit. Naturally, when you run out of energy you die.

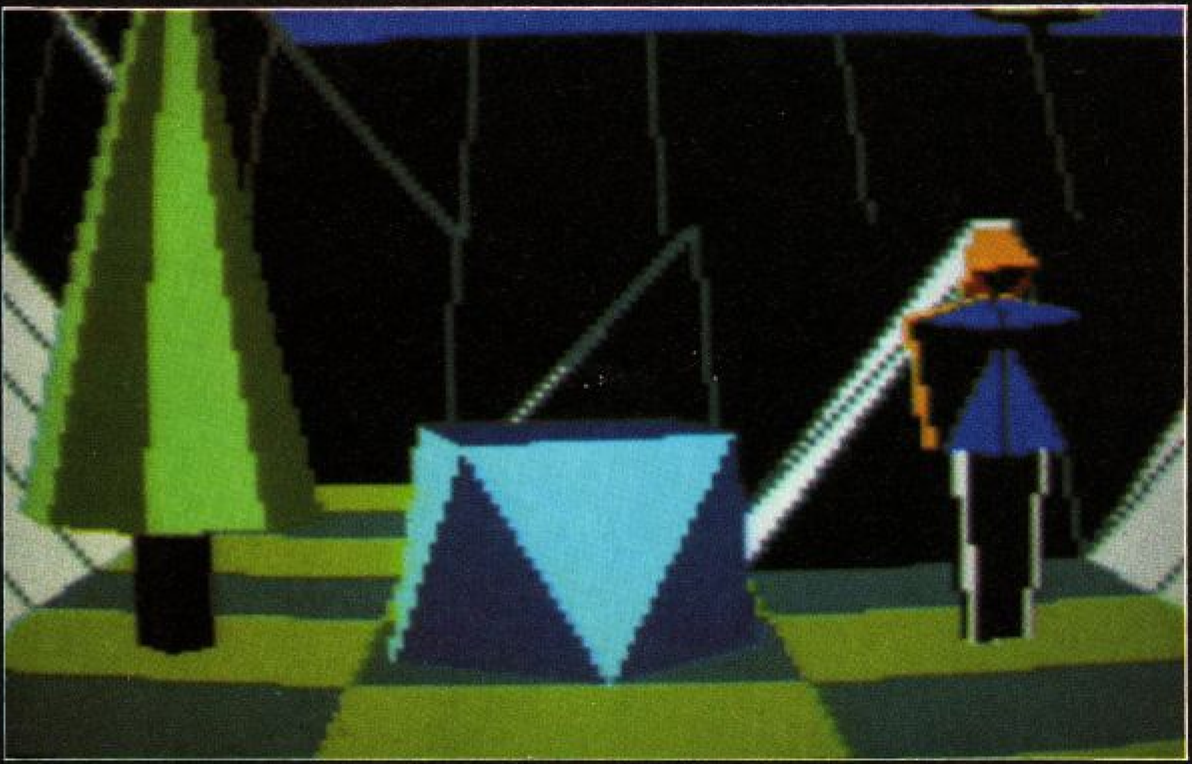
Problem is that on many landscapes not only is there a Sentinel, but Guardians, beings with exactly the same powers, all slowly scanning the terrain.

When you get on a landscape with, say, six of them, what seems like a slow, albeit cerebral pastime, becomes faster and more furious than the most frantic shoot-em'up, as you desperately search for somewhere to hide. If you are even slightly paranoid, this is not the game for you – it'll only confirm your worst fears!

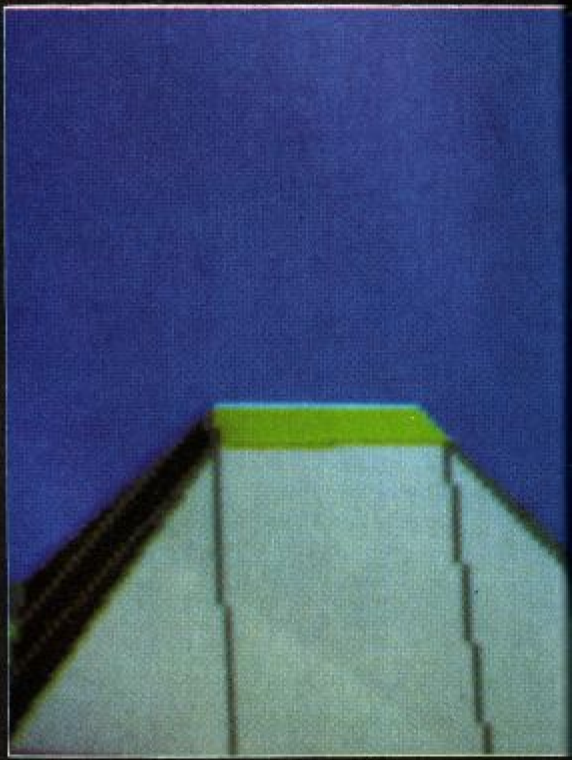
The game

The view on the screen is what you can see from the robot you are presently inhabiting. You may rotate or look up and down, although this may consume precious time.

The alien landscapes – now more colourful than ever before – create an eerie atmosphere, and because the display puts you there, right in the middle of the action, the tension soon



Three types of object: Tree, boulder and robot



Stacking 'em up high

mounts as you dodge the gaze and try to work out a strategy that will allow you to destroy the Sentinel.

After the loading screen the program will ask you to enter a landscape number. If you input any number other than zero it will ask you for an entry code, an eight figure number.

You get them (and the CPC one's are different from the BBC and Commodore versions I'm afraid) only by completing the level.

Once you have absorbed the Sentinel you move to his plinth and then hyperspace. Now the number of units of energy you have left is added to the landscape number you have just departed from (say you are on landscape 10 and have 5 units of energy remaining: 10+5=15) and you are given the entry code for the landscape corresponding to that number, in this case, 15.

I estimate that taking a quarter of an hour per level, with an excess of 15 energy units at the end of each landscape (and that's good going) there is a good three months of non-stop play in the game. That's if you never get killed, of course.

I can see the eyes of a thousand budding hackers light up with the idea of cracking this coding system – but Mr Crammond himself says that he's made it very difficult to get into.

Once you input the correct code you wait a few moments, then the whole of the landscape is shown in 3D, with the position of the Sentinel and, if present, the Guardians. This gives you a once and only chance to study the terrain from an objective point of view and to start planning possible strategies, because once you're "inside" the landscape it looks very different.

What the display doesn't show you is your starting position, so don't make too many specific plans.

Once inside, for the only time in the game, you can relax. You can look around; take your time because the Sentinel won't start moving until you make a positive action, like absorbing or creating an object.

All action is controlled via the keyboard, and although at first there seem to be one hell of a lot of keys, you'll soon find yourself getting used to it.

Press the spacebar, and a cross hair cursor appears, indicating where you can absorb/create things. Movement left and right is S/D; up and down, L/comma.

To absorb energy you move the cursor to the base of an object and press A. To create a tree, again at the point of the cursor, press T, for a boulder, B, a robot, R.

Q will transfer your "presence" to another robot, while H will hyperspace you to another location on the landscape (the same level, or lower) – but as it creates another robot at your new location, it'll cost you three energy points.

Lastly, U will turn you 180 degrees immediately, instead of waiting for the long scroll around (NB: Conservatives must never press this button, on pain of moving sharply to the left).

The moment you start doing something you'll hear the ominous boom of the Sentinel moving around. In the end it's a noise you'll have nightmares about.

The top right of the display will show when you are being scanned, it fills up with "snow" and a nerve-grating noise is emitted. Sometimes, however, because of the terrain, you'll only be half-scanned, so only half the display snows up. This is still bad news.

Although you won't be drained of energy, the Sentinel will look around for the nearest tree and convert it into a Meanie. This Meanie is a mini-sentinel that will try and scan you, and when it does, will automatically Hyperspace you. Which is bad news if you have less than three energy units left.

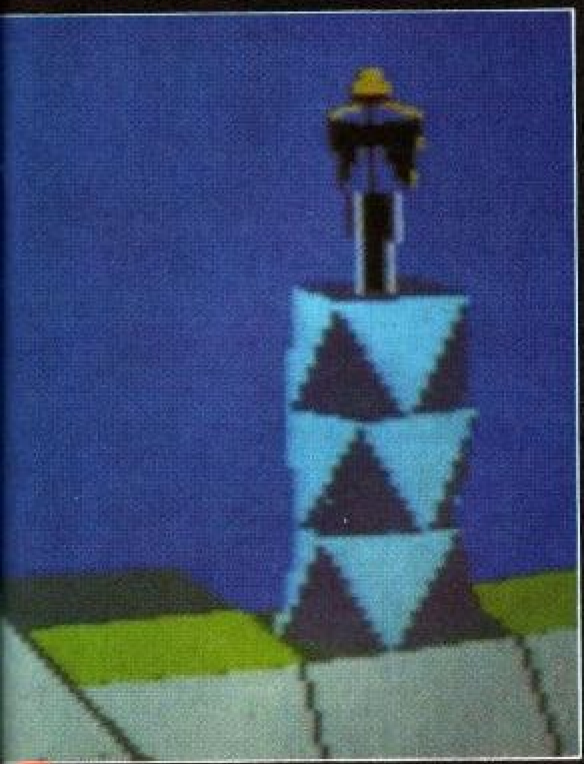
The strategy

The game is all about getting higher than the opposition, then absorbing them. You might think this is difficult, considering you can't physically move, but the solution is quite easy.

What you do is to create a stack of



Landscape scene





One Sentinel and two Guardians

boulders, create a robot on top of that, then transfer. Simple, huh?

Problem is, it's expensive in energy terms. Plus when you start poking your head up above the mountains you become easier to scan.

Be aware of where the Sentinels/Guardians are, and which way they are rotating. This is difficult, particularly if there are more than three to worry about. You must carry a picture of the complete landscape in your head, and imagine where the safe spots are – and how long they are likely to stay that way. This makes your brain hurt at first, but is vital for success.

Be careful with your energy supply, but don't be afraid of being bold when you think you have a chance to strike decisively.

You can always pick up extra energy by absorbing the surrounding trees. Another neat aspect to the game incidentally, the energy within the landscape is constant, so if you or one of the artifacts you left behind is scanned, the energy is not destroyed, but distributed as the lowest form of energy, trees, randomly about the system.

It is vital to absorb your old body, plus any boulders you were standing on, when you transfer. Failure to *do* so will cost you a lot of energy.

Finally, remember that you can create trees, as well as boulders and robots. They can be used to block the energy-draining stare of the opposition.

The conclusion

Sentinel is a game of unique qualities. It requires intelligence, quick thinking and an agile brain. It is not the fastest game in the world, some might find the scrolling as you view too slow in fact, but this only serves to build up the tension that increases as you get nearer your goal.

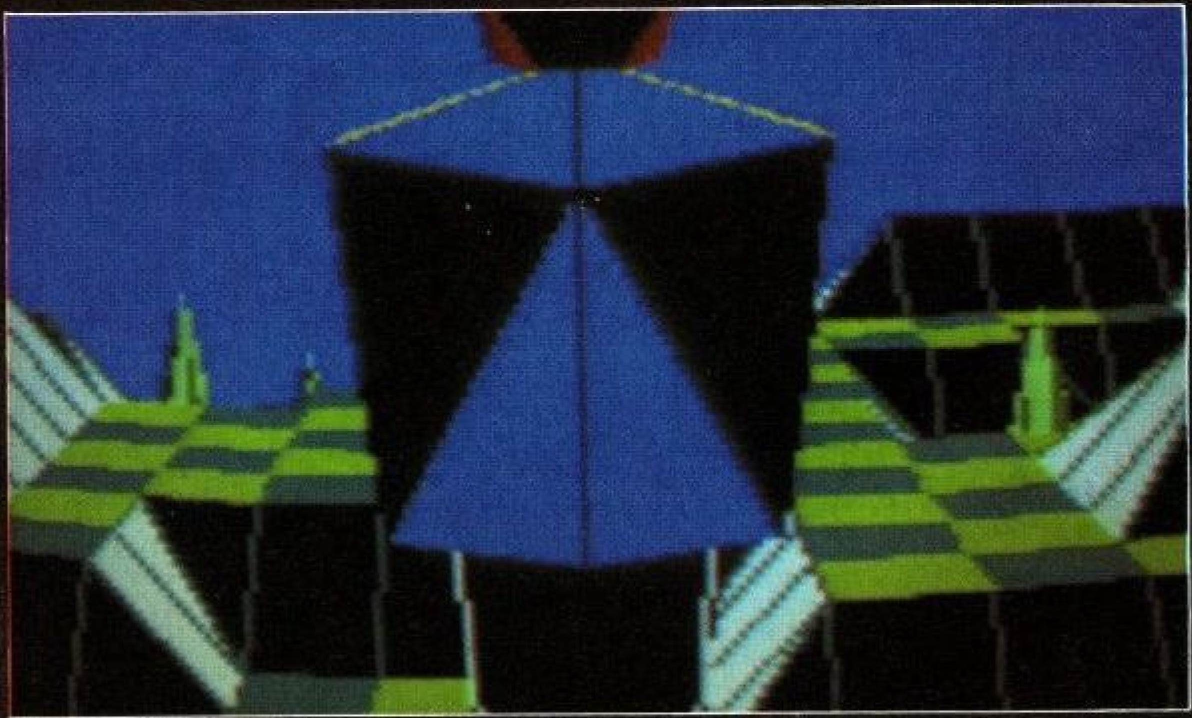
There's more life in it than most – and it's a game that you'll find yourself coming back to again and again. It's frustrating, it's infuriating, it's challenging as hell.

Sentinel confirms Geoff Crammond as one of Britain's foremost game designers. If only he played football.

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Part 5 ASSEMBLY POINT

Hands up everybody who typed in and tried to assemble the sort routine in Part 2 of this series. My hand, you can probably guess, is not raised. Yes, there were two cock-ups in the listing, one by the typesetter which isn't fatal, and one by me, which is.

The two setting errors are near the start of the listing, just before and just after the label .sort1. You'll notice a two pairs of OR L mnemonics. Each, of course, should only be a single OR L. The extra one has dropped off the end of the comment for the previous line, thus:

OR L ;A = A OR L

This extra OR doesn't affect the program operation but is redundant (Exercise for reader: Had the line been AND L, would a repeat have mattered? Would a repeated XOR L matter?)

My mistake was that, in extracting the sort routine from a larger utility program of mine, I missed out two variables. This will have produced some "Undefined label" errors on assembly. You need to add the lines:

```
.list-counter WORD 0;(some
assemblers need DEFW 0)
.list-length WORD 0
```

This allows for lists of up to 65535 strings, more than you could possibly fit into the memory available on a Z80.

Anyway, my apologies. The editor has explained to the typesetter and to me that mistakes in articles for beginners are not a good idea, and we'll do our best despite the fact that it's difficult typing with stumps. That's the other reason I didn't put up my hand.

Onward, then, into the wonderful world of kernel events.

Put bounce back into your blob

In this month's machine code snippet the theme is altitude. Peter Green presents a cock-up, a pick-me-up and a back-up.

Cursors, foiled again

Is your cursor tired, dull and listless? Does it lie there on your monitor screen, totally comatose? Peter Green's Patent Pick-Me-Up will put bounce in your blob.

Basic users will know the text cursor only as a reversed-out blob which appears in command mode or when a program is waiting for the response to an input statement (or a second press of the Esc key). Worse, when you're editing a Basic program and using the Copy key, both cursors (printing position and copying position), look the same. On a screenful of Mode 2 text you can easily get confused.

If you use programs such as Arnor's Protext word processor you'll notice that the cursor is flashing slowly on and off during text entry, drawing attention to itself. This is very easy to achieve using the event and timer capabilities built into the Amstrad and readily available to the machine code programmer.

Events are just pieces of program code which don't form part of the main program you're running. When a suitable condition occurs, the event is kicked or triggered, and as part of the next interrupt service (that is, the regular break the Amstrad's operating system takes every 1/50th second to scan the keyboard, flash the inks, process any sounds and so on), the event's program is run.

In a sense, events allow you to extend the way the operating system works.

The closest equivalent that the Basic programmer has are the AFTER and EVERY commands, which GOSUB to a specified Basic subroutine once after a time delay, or every so often.

However, these are not really events in the operating system sense as they stop working when you break into the Basic program. True events, once installed or added to the interrupt service list, keep running regardless until you reset the machine, use RUN "name" (which does a reset as part of its initialisation), or explicitly turn the event off.

To get the full lowdown on event-handling there isn't really any alternative to reading the relevant parts of the firmware specification, SOFT 158 (or the newer version SOFT 968).

The sections of interest are Chapters 10 and 11, the Kernel jumpblock entries at &BCC8 and &BCD7 to &BD0A inclusive, and Appendix X. There's just too much information there for me to explain in detail, but what I can do is give a couple of simple examples (which the Firmware Guide sorely lacks), examples usually being worth 1000 words.

Listing I is the program to generate a flashing cursor and breaks into two sections – the installation, and the actual event handling which does the flashing.

The installation has two parts; the first initialises the event block (where the Amstrad stores details of the address of the flash routine, whether it's in ram or rom, what type of event it is and whether it's been triggered or not).

It's as easy as loading all the right numbers or addresses (using labels) into the right registers and calling KL-INIT-EVENT.

The second part tells the Amstrad we want the event to be triggered or kicked by the ticker, which ticks every 1/50th second. At every tick the count in each block on the tick list is decremented and when it hits zero the count is reset to the recharge value and the corresponding event block kicked.

Kick off

Here we want the cursor to flash about four times a second, so both the initial count and recharge count are 12 (for 12/50ths of a second). This produces behaviour similar to the EVERY command.

If the recharge value in BC had been zero the ticker would have kicked the event once only and then stopped. This is for time delay effects and corresponds to the AFTER command in Basic. (The example in Listing II shows how this can be used.)

When the Amstrad detects that the ticker has kicked the event block it looks up the address of the program we told it (flash) and CALLS it.

As you can see from the listing, the routine is trivial. A counter cycles repeatedly from 0 to 255 and round again, and the cursor is enabled or disabled (using routines in the Firmware) depending on whether the count is odd or even.

The only point to note is that three times in Listing I, a subroutine is JUMPED to (JP) instead of CALLed. This has the same effect as:

```
CALL subroutine
RET
```

which is what we want, but it takes one



byte less memory and slightly less time to execute.

The remaining question is, where in memory should we assemble and run this routine? The tick and event blocks at least, must go in the ram between &4000 and &BFFF inclusive (that is, not in ram under a rom) so that they are available regardless of the rom selection state.

Now Amstrad recommended practice is that users should not muck about in memory above &B0FF, but putting code below this address means it has to be relocatable (to allow for the unknown amount of memory that can be snaffled as workspace by any extension roms you have fitted).

Relocatable code is a real pain to write on the Z80, which just isn't designed for it. However, people with the disc drive manual will see that there is an extended jumpblock starting at &BE80 and running to &BEBF, which is for CP/M only and has no function in Amsdos or tape systems.

There's no reason that I can see why code can't be run here – so I have! Just keep it short, because the stack (stacks are explained next month) starts a bit higher, at &C000, and grows downwards in memory. If your program is so big that it collides with the stack, untold misery will be thine.

If you install the flash routine, exit to Basic and edit a program with the Copy cursor, you'll see that only one of the cursors flashes (the copy cursor is steady). This is because the firmware routines only affect the single firmware text cursor; the copy cursor is generated separately by Basic.

Jogging for health

Jogging your memory for mental health, that is. Although every programmer knows the golden rule, BACK UP REGULARLY AND OFTEN, it's easy to get carried away with what you're doing and only realise you've been typing for three solid hours when the central heating switches off, the mains surges and the cheerful Amstrad sign-on message appears before you.

Cue for gnashing of teeth, thumping of desk, computer or nearest available mammal . . .

Listing II is the source code for a second event routine, also installed at &BE80, which nudges your memory when it's time to make a back-up: indeed, it makes it pretty well impossible to do anything else.

It works like this. When the program is installed it starts a 15 minute timer running in the background. Because this is an automatic, interrupt-driven routine, you can start writing a Basic program, or go into Protext or other word processor and start composing deathless prose like this article.

The only limitation is, as above, that you can't do anything which will cause a system reset, because this will disable all kernel events including your timer. Protext can be entered by using a command which does not do a reset. If your application cannot be loaded and CALLed, only RUN, then Back-Up won't work.

After 15 minutes the timer hits zero, the back-up event is kicked, and the timer switches itself off (the recharge count is zero, so the timer works in the AFTER type of mode, not EVERY, like the cursor flash).

The operating system then processes the event by getting the border colour settings and saving them (so that things can be put back the way they were later) and starts the border flashing red and black. Believe me, this will attract your attention – and not just because of the flashing.

Let's face it, the Amstrad colour monitors are not exactly state-of-the-art (well, what do you expect for £300!). They have this interesting property that the screen distortion characteristics depend on the overall screen brightness, so that as the border pulses from dark to light and back again, so

```
LIMIT &C000              ;Tell MAXAM we're putting code higher than HIMEM

TXT_CUR_ENABLE  EQU &BB7B
TXT_CUR_DISABLE EQU &BB7E
KL_INIT_EVENT   EQU &BCEF
KL_ADD_TICKER   EQU &BCE9


ORG &BE80                ;This is a bit naughty but works fine (see text)

.install
LD HL,flash_event        ;LET HL = address of event block
LD BC,&81FF              ;LET BC = event class/ROM select code
LD DE,flash              ;LET DE = address of event routine
CALL KL_INIT_EVENT       ;Initialize the event block

LD HL,flash_tick         ;LET HL = address of ticker block
LD DE,12                 ;LET DE = initial tick count
LD BC,12                 ;LET BC = recharge tick count
JP KL_ADD_TICKER         ;Add the event to the tick list and exit

.flash_tick  RMEM 6      ;Reserve 6 bytes for the tick block and
.flash_event RMEM 7      ;7 bytes for the event block (must follow tick block)

.flash
LD A,(counter)           ;LET A = contents of counter
INC A                    ;LET A = A + 1
LD (counter),A           ;LET counter = new value in A
RRCA                     ;Rotate low bit of A into carry flag to test odd/even
JP C,TXT_CUR_ENABLE      ;IF A was odd THEN enable the cursor
JP TXT_CUR_DISABLE       ;ELSE disable the cursor

.counter    BYTE 0       ;Reserve one byte for counter
```

Listing I

To order please use the form on Page 95

the text (especially at the edges and corners of the screen) jumps back and forth about a pixel's width as well.

This doesn't make the screen unreadable, so you can still type in the commands to save your work, but believe me, after about 30 seconds it starts to strain your eyes. Like I said, you WILL want to back up.

The flashing should only stop when the back-up has been done successfully, and ideally it should be automatic.

Now saving a file under Amsdos has three stages – open the file, write the data to tape or disc, and close the file. Obviously we want to reset the border colours if and only if the whole sequence was successful, which means only if the CAS-OUT-CLOSE firmware routine succeeds.

We can't rewrite our word processor software to do this for us, but we can intercept the CAS-OUT-CLOSE operation at the firmware jumpblock entry (that's what it's there for) and muck about with it as we please.

The routine labelled patch-disc does this for us. It copies whatever was in the jumpblock to a safe location and replaces it with a JP to our new disc routine, labelled by some strange coincidence as new-disc.

When the word processor tries to close the output file, it is sent to new-disc instead. New-disc first puts the jumpblock back the way it was and closes the file (for slightly complicated reasons, we can't just CALL the old jumpblock contents in their new home at label disc-jump. The Amstrad gets confused unless we put them back where they were). When the program returns, the patch is put back.

If the file wasn't successfully closed the carry flag is reset by CAS-OUT-CLOSE, else it is set. We don't want to stop the border flashing or restart the timer if the save failed, and this action is performed by the CALL C (CALL only if carry set) and RET NC (RETurn only if carry reset) instructions.

If the carry is set the old border colours are restored and the program drops through into the start-timer routine to set up another 15 minute cycle. It doesn't matter if you SAVE before the the flashing starts – the timer can safely be re-initialised like this even if it's still counting.

Finally, note that the return from new-disc jumps back into the word processor, which made the original CAS-OUT-CLOSE call and doesn't know you've been mucking it about, so it's important to preserve the state of the carry flag exactly as CAS-OUT-CLOSE returned it.

The firmware manual shows that we don't have to worry about any of the other registers, as they are expected to be corrupted anyway. Now you'll never forget to back up again.

```
LIMIT &C000

.SCR_SET_BORDER EQU &BC38
.SCR_GET_BORDER EQU &BC3B
.CAS_OUT_CLOSE  EQU &BC8F
.KL_INIT_EVENT  EQU &BCEF
.KL_ADD_TICKER  EQU &BCE9


org &BE80

.install
LD HL,backup_event        ;LET HL = address of event block
LD BC,&81FF               ;LET BC = event class/ROM select address
LD DE,backup              ;LET DE = actual address of the event routine
CALL KL_INIT_EVENT        ;Initialise the event block
CALL patch_disc           ;Intercept the CAS_OUT_CLOSE jumpblock entry
CALL SCR_GET_BORDER       ;Find out what colours the border is using
LD (border),BC            ;Store them in the pair of bytes labelled border
JR start_timer            ;Start the 15-minute timer running and exit

.backup_tick      RMEM 6  ;Reserve 6 bytes for ticker block
.backup_event     RMEM 7  ;Reserve 7 bytes for event block


.backup
CALL SCR_GET_BORDER       ;Find out what colours the border is using
LD (border),BC            ;Store them so we can put things back the way they were
LD BC,&0006               ;LET BC = numbers for black/red flashing border
JP SCR_SET_BORDER         ;Set the border to these colours and exit

.border           WORD 0  ;Two bytes of storage space for the border colour

.patch_disc
LD A,(CAS_OUT_CLOSE)      ;LET A = first byte in jumpblock entry
LD (disc_jump),A          ;Store this value in byte labelled disc_jump
LD HL,(CAS_OUT_CLOSE+1)   ;LET L and H = second and third jumpblock bytes
LD (disc_jump+1),HL       ;Store these in bytes (disc_jump+1),(disc_jump+2)

LD A,&C3                  ;LET A = opcode for JP
LD (CAS_OUT_CLOSE),A      ;Store this in first byte of jumpblock entry
LD HL,new_disc            ;LET L and H = address of our replacement routine
LD (CAS_OUT_CLOSE+1),HL   ;Store it in the second and third bytes of jumpblock
RET                       ;and return from subroutine

.new_disc
LD A,(disc_jump)          ;Replace the
LD (CAS_OUT_CLOSE),A      ;original contents
LD HL,(disc_jump+1)       ;of the three bytes
LD (CAS_OUT_CLOSE+1),HL   ;in the jumpblock
CALL CAS_OUT_CLOSE        ;Go and do this original routine, but come back here
CALL patch_disc           ;Put back the patch pointing to our new_disc routine
LD BC,(border)            ;LET BC = the border colour(s) we stored
PUSH AF                   ;Manual says a flag is returned in carry, so save F reg
CALL C,SCR_SET_BORDER     ;Set the border to old colours only if SAVE succeeded
POP AF                    ;Restore the F register
RET NC                    ;IF there's No Carry (the SAVE failed) THEN quit (don't
                          ;want to restart the timer again - see text)

.start_timer
PUSH AF                   ;Save the F register
LD HL,backup_tick         ;LET HL = address of tick block
LD DE,45000               ;LET DE = 15 minutes * 60 secs * 50
LD BC,0                   ;LET BC = value of recharge entry
CALL KL_ADD_TICKER        ;Place the block onto the tick list
POP AF                    ;Restore the F register
RET                       ;Exit

.disc_jump        RMEM 3  ;Three bytes to store the original jumpblock contents

list
end
```

Listing II

ACU

FLIP 'EM

Andrew Campbell offers the Amstrad PCW version of a classic strategy game.

This is an ancient game of logic often known as Othello or Reversi. This version has been written in Mallard Basic and plays a very strong game.

The rules

The playing area or board consists of an 8 by 8 grid on which counters are placed. The counters are coloured white on one side and black on the other.

The idea is to wipe out your opponent's counters – in which case the game ends there and then – or continue playing until the board is full and then decide the winner by counting.

To gain some of your opponents counters you must trap them between your own. Once you have done this the trapped counters are turned over so that they show your colour.

The strategy

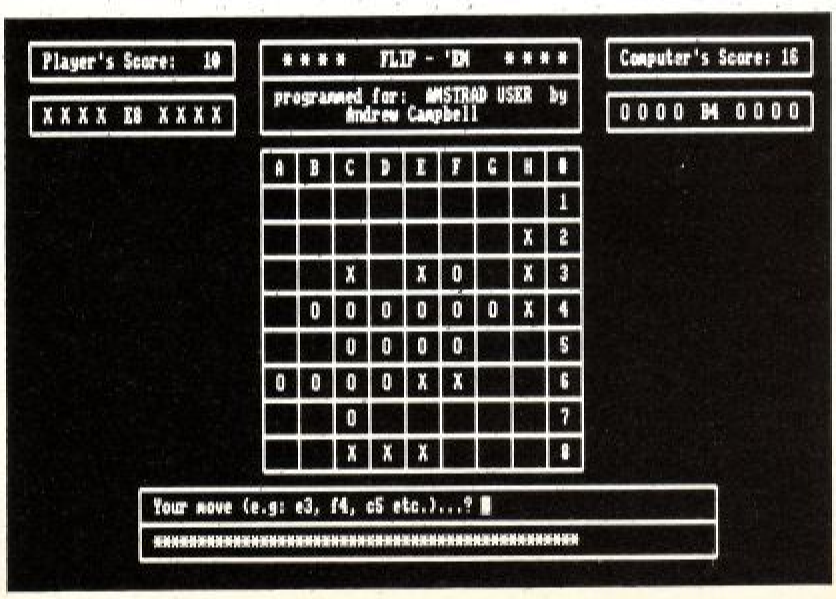
Figure 1 shows how the computer decides where to move. It also shows the positions on the board rated from 1 (best move) to 7 (worst move).

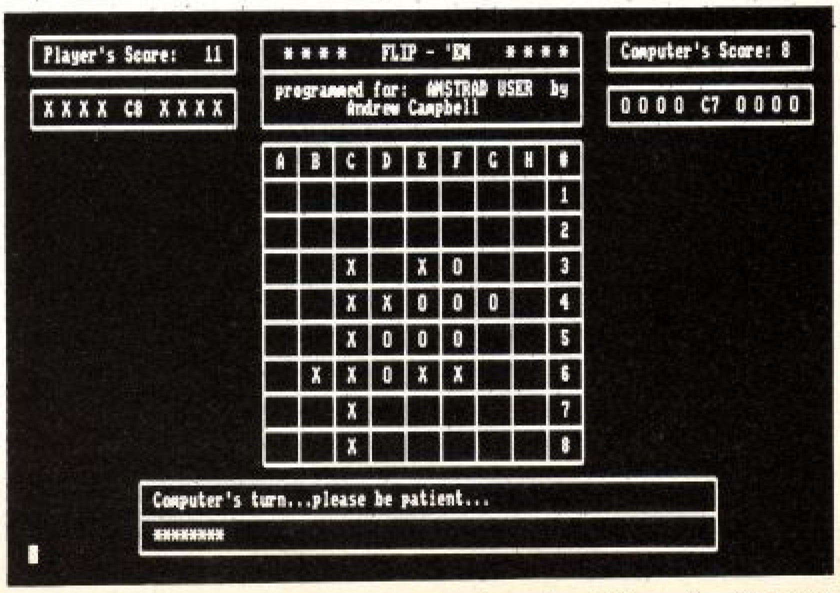
A	B	C	D	E	F	G	H	
1	7	2	3	3	2	7	1	1
7	7	6	6	6	6	7	7	2
2	6	4	5	5	4	6	2	3
3	6	5	X	0	5	6	3	4
3	6	5	0	X	5	6	3	5
2	6	4	5	5	4	6	2	6
7	7	6	6	6	6	7	7	7
1	7	2	3	3	2	7	1	8

Figure I: How the computer makes up it's mind

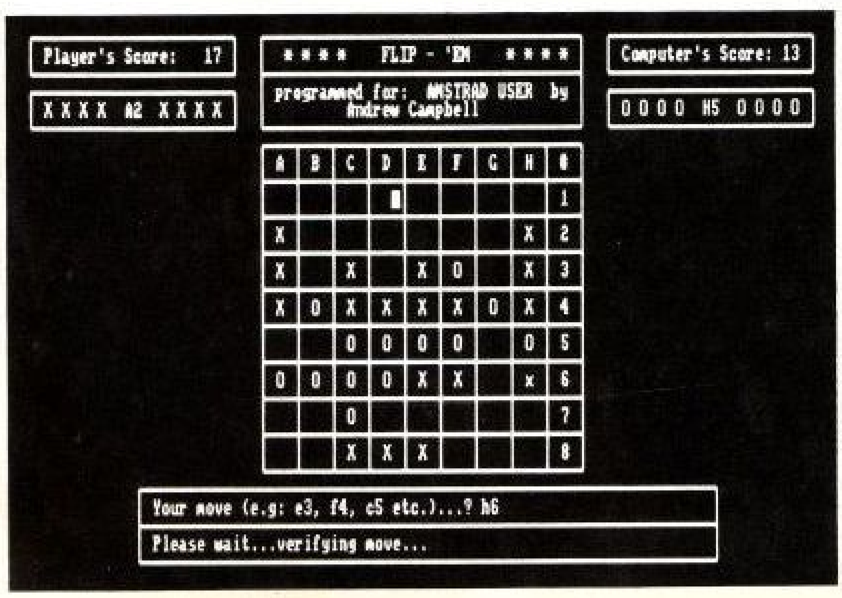
The program

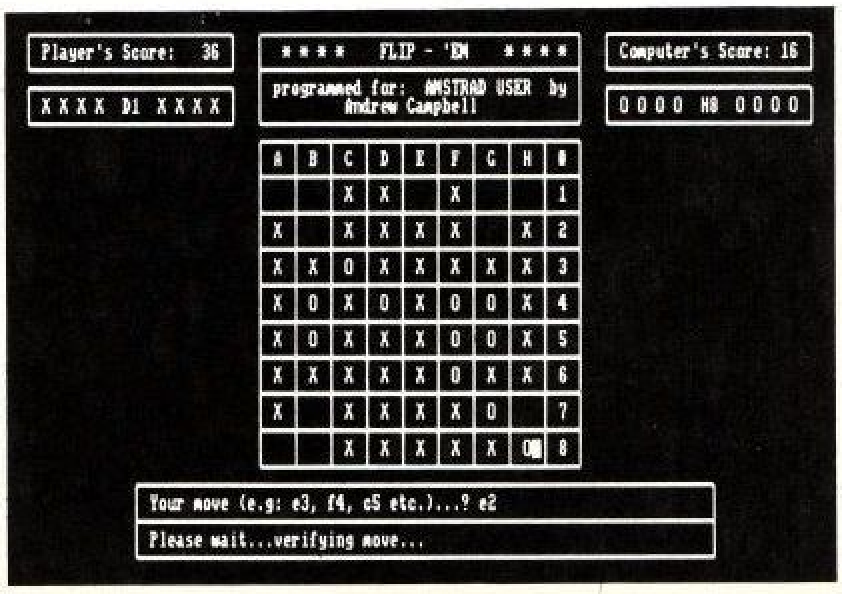
10-100	Main Program.
130-230	Dimension Arrays (DIM), set up the strings and define functions (FN).
250-380	Produce grid on screen.
400-420	Label edges of grid.
440-600	Produce heading and score boxes.
620-630	Print the prompt "difficulty level?"
640-690	Input difficulty level and set up board.
710-730	Print board inside grid.
750-860	Input and verify player's move.
880-890	Display "Illegal Move" prompt.
910-1000	Calculate and print scores. Check for end of game.
1020-1300	Move verification routines.
1330-1500	Computer's move calculation.





```
10 ' MAIN PROGRAM
20 ' ============
30 ' Set up board
40 GOSUB 130
50 ' Player's choice
60 GOSUB 750
70 ' Computer's choice
80 GOSUB 1330
90 ' Loop until end of game
100 GOTO 50
110 '
120 '
130 DIM b$(8,8), n$(8), u$(7)
140 esc$=CHR$(27)
150 home$=esc$+"H"
160 cls$=esc$+"E"+home$
170 end$="G A M E   O V E R"
180 u$(1)="A1A8H1H8":u$(2)="A3C1F1H3H6F8C8A6"
190 u$(3)="D1E1H4H5E8D8A5A4":u$(4)="C3F3F6C6"
200 u$(5)="D3E3F4F5E6D6C5C4":u$(6)="C2D2E2F2G3G4G5G6F7E7D7C7B6B5B4B3"
210 u$(7)="A2B2B1G1G2H2H7G7G8B8B7A7"
220 DEF FNtab$(col%,row%,text$)=esc$+"Y"+CHR$(32+row%)+CHR$(32+col%)+text$
230 DEF FNbox$(k1%,k2%,k3%,k4%,k5%,k6%)=esc$+"Y"+CHR$(32+k2%)+CHR$(32+k1%)+CHR$(k3%)+STRING$(k4%,CHR$(k5%))+CHR$(k6%)
240 '
250 PRINT cls$:FOR i%=1 TO 4
260 READ k%:q$(i%)=q$(i%)+CHR$(k%)
270 READ k%,l%:p$=CHR$(k%)+CHR$(k%)+CHR$(k%)+CHR$(l%)
280 FOR j%=1 TO 8:q$(i%)=q$(i%)+p$:NEXT j%
290 READ k%,l%:p$=CHR$(k%)+CHR$(k%)+CHR$(k%)+CHR$(l%)
300 q$(i%)=q$(i%)+p$:NEXT i%
310 PRINT FNtab$(26,6,q$(1))
320 FOR i%=7 TO 21 STEP 2:PRINT FNtab$(26,i%,q$(2))
330 PRINT FNtab$(26,i%+1,q$(3)):NEXT i%
340 PRINT FNtab$(26,23,q$(2)):PRINT FNtab$(26,24,q$(4))
350 DATA 150,154,158,154,156
360 DATA 149,32,149,32,149
370 DATA 151,154,159,154,157
380 DATA 147,154,155,154,153
390 '
400 r$="ABCDEFGH#":c$="12345678 "
410 FOR i%=1 TO 9:PRINT FNtab$(24+(i%*4),7,MID$(r$,i%,1))
420 PRINT FNtab$(60,7+(i%*2),MID$(c$,i%,1)):NEXT i%
430 '
440 FOR i%=1 TO 23:READ k1%,k2%,k3%,k4%,k5%,k6%
450 PRINT FNbox$(k1%,k2%,k3%,k4%,k5%,k6%):NEXT i%
460 FOR i%=1 TO 7:READ col%,row%,text$
470 PRINT FNtab$(col%,row%,text$):NEXT i%
480 DATA 26,0,150,35,154,156,26,1,149,35,32,149,26,2,151,35,154,157
490 DATA 26,3,149,35,32,149,26,4,149,35,32,149,26,5,147,35,154,153
500 DATA 0,0,150,22,154,156,0,1,149,22,32,149,0,2,147,22,154,153
510 DATA 0,3,150,22,154,156,0,4,149,22,32,149,0,5,147,22,154,153
520 DATA 65,0,150,22,154,156,65,1,149,22,32,149,65,2,147,22,154,153
530 DATA 65,3,150,22,154,156,65,4,149,22,32,149,65,5,147,22,154,153
540 DATA 12,25,150,64,154,156,12,26,149,64,32,149,12,27,151,64,154,157
550 DATA 12,28,149,64,32,149,12,29,147,64,154,153
560 DATA 28,1,"* * * *   O T H E L L O   * * * *"
570 DATA 28,3,"programmed for:  AMSTRAD USER  by"
580 DATA 28,4,"        Andrew Campbell
590 DATA 2,1,"Player's Score:",67,1,"Computer's Score:"
600 DATA 2,4,"X X X X       X X X X",67,4,"0 0 0 0       0 0 0 0"
610 '
620 PRINT FNtab$(14,26,STRING$(60," "))
630 PRINT FNtab$(14,26,"Difficulty level (1. Novice/2. Competent/3. Master)...");
640 INPUT level$:level=VAL(level$)
650 IF level<1 OR level>3 THEN GOTO 620
660 FOR i%=1 TO 8:FOR j%=1 TO 8:b$(i%,j%)=" ":NEXT j%:NEXT i%
670 IF level=1 THEN b$(1,1)="X":b$(8,1)="X":b$(1,8)="X":b$(8,8)="X"
680 IF level=3 THEN b$(1,1)="0":b$(8,1)="0":b$(1,8)="0":b$(8,8)="0"
690 b$(4,4)="X":b$(5,4)="0":b$(4,5)="0":b$(5,5)="X":GOSUB 910
700 '
710 FOR i%=1 TO 8:FOR j%=1 TO 8
720 PRINT FNtab$((j%*4)+24,(i%*2)+7,b$(j%,i%));
730 NEXT j%:NEXT i%:RETURN
740 '
750 PRINT FNtab$(14,26,STRING$(60," "))
760 PRINT FNtab$(14,26,"Your move (e.g: e3, f4, c5 etc.)...");:INPUT move$
770 PRINT FNtab$(14,28,STRING$(60," "))
780 PRINT FNtab$(14,28,"Please wait...verifying move...")
790 l$=UPPER$(LEFT$(move$,1)):r$=RIGHT$(move$,1):move$=l$+r$
800 x%=INSTR("ABCDEFGH",l$):y%=INSTR("12345678",r$)
810 IF x%=0 OR y%=0 THEN GOSUB 880:GOTO 750
820 t$=b$(x%,y%):IF t$<>" " THEN GOSUB 880:GOTO 750
830 b$(x%,y%)="x":flag%=0:x$="X":y$="0":GOSUB 710:GOSUB 1020
840 IF s%=0 THEN b$(x%,y%)=" ":GOSUB 880:GOTO 750
850 IF s%>0 THEN b$(x%,y%)=x$:GOSUB 710:GOSUB 910
860 RETURN
870 '
880 PRINT FNtab$(14,28,STRING$(60," "))
890 PRINT FNtab$(14,28,"Illegal move! - Try again..."):RETURN
900 '
910 sc1%=0:sc2%=0:FOR i%=1 TO 8:FOR j%=1 TO 8
920 IF b$(j%,i%)="X" THEN sc1%=sc1%+1
930 IF b$(j%,i%)="0" THEN sc2%=sc2%+1
940 NEXT j%:NEXT i%
950 PRINT FNtab$(19,1,STR$(sc1%)+" ")
960 PRINT FNtab$(84,1,STR$(sc2%)+" ")
970 IF x$="X" THEN PRINT FNtab$(11,4,move$)
980 IF x$="0" THEN PRINT FNtab$(76,4,move$)
990 IF sc1%+sc2%=64 THEN PRINT FNtab$(36,15,end$):END
1000 RETURN
1010 '
1020 FOR i%=1 TO 8:n$(i%)="":NEXT i%
1030 IF y%>=3 THEN FOR i%=y% TO 1 STEP -1:n$(1)=n$(1)+b$(x%,i%):NEXT i%
1040 IF x%<=6 AND y%>=3 AND y%>9-x% THEN FOR i%=0 TO 8-x%:n$(2)=n$(2)+b$(x%+i%,y%-i%):NEXT i%:ELSE IF y%<=9-x% THEN FOR i%=0 TO y%-1:n$(2)=n$(2)+b$(x%+i%,y%-i%):NEXT i%
1050 IF x%<=6 THEN FOR i%=x% TO 8:n$(3)=n$(3)+b$(i%,y%):NEXT i%
1060 IF x%<=6 AND y%<=6 AND x%<y% THEN FOR i%=0 TO 8-y%:n$(4)=n$(4)+b$(x%+i%,y%+i%):NEXT i%:ELSE IF x%>=y% THEN FOR i%=0 TO 8-x%:n$(4)=n$(4)+b$(x%+i%,y%+i%):NEXT i%
```





```
1070 IF y%<=6 THEN FOR i%=y% TO 8:n$(5)=
     n$(5)+b$(x%,i%):NEXT i%
1080 IF x%>=3 AND y%<=6 AND x%>9-y% THEN
      FOR i%=0 TO 8-y%:n$(6)=n$(6)+b$(x%
     -i%,y%+i%):NEXT i%:ELSE IF x%<=9-y%
      THEN FOR i%=0 TO x%-1:n$(6)=n$(6)+
     b$(x%-i%,y%+i%):NEXT i%
1090 IF x%>=3 THEN FOR i%=x% TO 1 STEP -
     1:n$(7)=n$(7)+b$(i%,y%):NEXT i%
1100 IF x%>=3 AND y%>=3 AND x%<y% THEN F
     OR i%=0 TO x%-1:n$(8)=n$(8)+b$(x%-i
     %,y%-i%):NEXT i%:ELSE IF x%>=y% THE
     N FOR i%=0 TO y%-1:n$(8)=n$(8)+b$(x
     %-i%,y%-i%):NEXT i%
1110 '
1120 s%=0:t%=0:FOR j%=1 TO 8
1130 a%=INSTR(n$(j%),x$):b%=INSTR(n$(j%)
     ,y$):c%=INSTR(n$(j%)," ")
1140 IF c%=0 THEN c%=9
1150 IF a%=0 OR b%=0 OR a%<b% OR c%<a% O
     R c%<b% THEN GOTO 1300
1160 IF j%>=1 AND j%<=4 THEN k%=j%+4
1170 IF j%>=5 AND j%<=8 THEN k%=j%-4
1180 IF MID$(n$(j%),a%+1,1)=" " AND MID$
     (n$(k%),2,1)=y$ THEN t%=t%+a%
1190 IF MID$(n$(j%),a%+1,1)=y$ AND MID$(
     n$(k%),2,1)=" " THEN t%=t%+a%
1200 FOR k%=2 TO a%-1:s%=s%+1:MID$(n$(j%
     ),k%,1)=x$:NEXT k%
1210 IF flag%=1 THEN GOTO 1300
1220 IF j%=1 THEN d%=0:FOR i%=y% TO 1 ST
     EP -1:d%=d%+1:b$(x%,i%)=MID$(n$(1),
     d%,1):NEXT i%
```

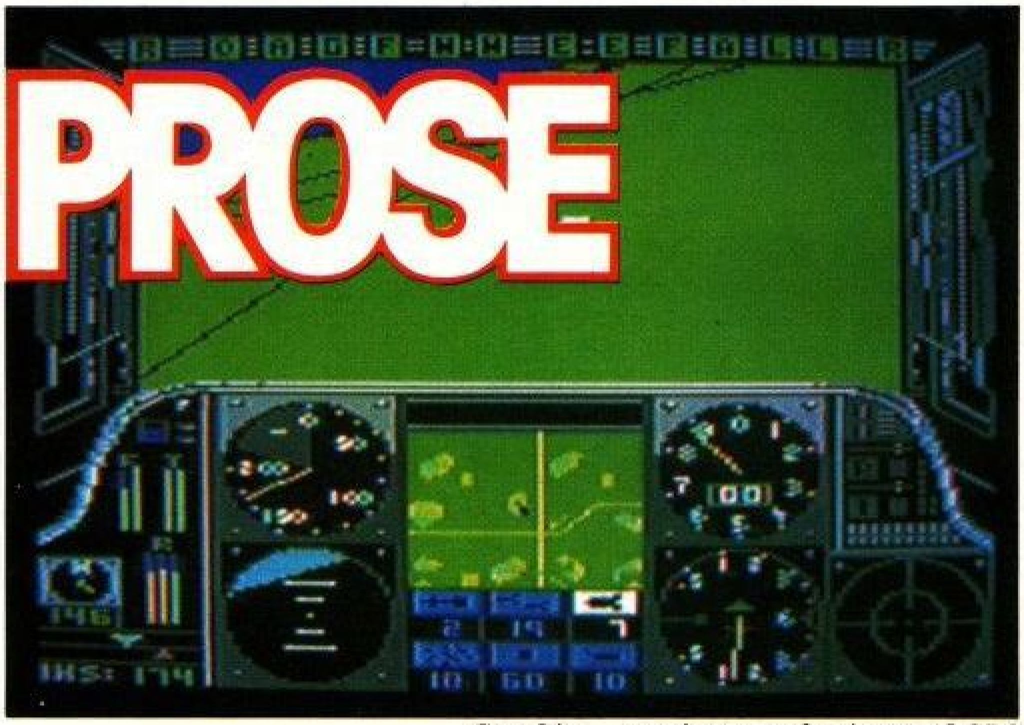
```
1230 IF j%=2 AND y%>9-x% THEN FOR i%=0 T
     O 8-x%:b$(x%+i%,y%-i%)=MID$(n$(2),i
     %+1,1):NEXT i%:ELSE IF y%<=9-x% THE
     N FOR i%=0 TO y%-1:b$(x%+i%,y%-i%)=
     MID$(n$(2),i%+1,1):NEXT i%
1240 IF j%=3 THEN d%=0:FOR i%=x% TO 8:d%
     =d%+1:b$(i%,y%)=MID$(n$(3),d%,1):NE
     XT i%
1250 IF j%=4 AND x%<y% THEN FOR i%=0 TO
     8-y%:b$(x%+i%,y%+i%)=MID$(n$(4),i%+
     1,1):NEXT i%:ELSE IF x%>=y% THEN FO
     R i%=0 TO 8-x%:b$(x%+i%,y%+i%)=MID$
     (n$(4),i%+1,1):NEXT i%
1260 IF j%=5 THEN d%=0:FOR i%=y% TO 8:d%
     =d%+1:b$(x%,i%)=MID$(n$(5),d%,1):NE
     XT i%
```

```
1270 IF j%=6 AND x%>9-y% THEN FOR i%=0 T
     O 8-y%:b$(x%-i%,y%+i%)=MID$(n$(6),i
     %+1,1):NEXT i%:ELSE IF x%<=9-y% THE
     N FOR i%=0 TO x%-1:b$(x%-i%,y%+i%)=
     MID$(n$(6),i%+1,1):NEXT i%
1280 IF j%=7 THEN d%=0:FOR i%=x% TO 1 ST
     EP -1:d%=d%+1:b$(i%,y%)=MID$(n$(7),
     d%,1):NEXT i%
1290 IF j%=8 AND x%<y% THEN FOR i%=0 TO
     x%-1:b$(x%-i%,y%-i%)=MID$(n$(8),i%+
     1,1):NEXT i%:ELSE IF x%>=y% THEN FO
     R i%=0 TO y%-1:b$(x%-i%,y%-i%)=MID$
     (n$(8),i%+1,1):NEXT i%
1300 NEXT j%:RETURN
1310 '
1320 '
```

```
1330 PRINT FNtab$(14,26,STRING$(60," "))
     :PRINT FNtab$(14,28,STRING$(60," ")
     )
1340 PRINT FNtab$(14,26,"Computer's turn
     ...please be patient...")
1350 d%=0:g%=0:h%=-60:FOR r%=1 TO 7:FOR
     w%=1 TO LEN(u$(r%)) STEP 2
1360 d%=d%+1:PRINT FNtab$(13+d%,28,"*"):
     move$=MID$(u$(r%),w%,2)
1370 l$=LEFT$(move$,1):r$=RIGHT$(move$,1
     )
1380 x%=INSTR("ABCDEFGH",l$):y%=INSTR("1
     2345678",r$)
1390 t$=b$(x%,y%):IF t$<>" " THEN GOTO 1
     430
1400 b$(x%,y%)="o":flag%=1:x$="O":y$="X"
     :GOSUB 1020
1410 IF s%-t%>h% THEN h%=s%-t%:g%=w%
1420 b$(x%,y%)=" "
1430 NEXT w%
1440 IF h%>0 THEN GOSUB 1470:r%=7
1450 NEXT r%:RETURN
1460 '
1470 move$=MID$(u$(r%),g%,2):l$=LEFT$(mo
     ve$,1):r$=RIGHT$(move$,1)
1480 x%=INSTR("ABCDEFGH",l$):y%=INSTR("1
     2345678",r$)
1490 b$(x%,y%)="o":GOSUB 710:flag%=0:x$=
     "O":y$="X":GOSUB 1020
1500 b$(x%,y%)="O":GOSUB 710:GOSUB 910:R
     ETURN
```

ACU

MICROPROSE



Gunship . . . coming soon for Amstrad CPC

Iolo Davidson visits the simulation specialists in their Cotswold HQ and finds a lot of ammunition in their armoury

LET'S get one thing straight right away – MicroProse don't program computer games. They do simulations, alright? Certainly they are enjoyable, certainly they are entertaining, but they are adult entertainment, not games.

Simon Barnard, the software manager at MicroProse's new UK subsidiary, used this "adult entertainment" tag quite a few times during my visit. I began to expect that a full-blown Samantha Fox simulation was about to bust out of a back room, but no, the accent is on violence not sex.

What, I wanted to know, was a big American software house doing setting up shop in the slow and somewhat pokey little Cotswold town of Tetbury?

The place is noted only for its annual woolsack race, a preponderance of antique emporia and the proximity of Highgrove House, where the Wales's live between Royal tours and tiffs with the press.

Of course, the local garden centre has just copped a Royal Warrant, By Appointment to Prince William's Pet Bunnies, Purveyors of Rabbit Pellets. Might the chance of Di popping in to pick up a polo simulation be the attraction?

Simon says no. The reason is simply that the right premises were available, at the right price, perhaps half what it would have cost to set up in some stark and anonymous industrial estate.

This is an important factor to a new company, just starting up; having to watch the costs until turnover is established and the money starts rolling in.

And besides, Stewart Bell, the managing director, lives just down the road and didn't fancy moving.

But a moment ago you were the third biggest, er . . . entertainment software company in the US of A, says I.

Well, MicroProse Inc. is pretty big, but MicroProse Ltd. is new, British and staffed entirely by Brits. One supposes that had there been a Yank invasion, only a flash penthouse in the docklands developments would have sufficed, but the home team know the real centre of Britain is out in the shires.

Quite right, I live nearby too. And I distinctly remember that the shop that MicroProse have taken over was previously filled with trendy furniture, impossible lamps, and 'objets'.

Now the main display in the big front shop window is Stewart Bell himself, sitting at his desk just a few feet from passersby, with a marvellous view of the old Cotswold stone covered marketplace.

Obviously not one of the backroom boys. Maybe he just wants to be first to the door handle when Di drops in.

Considering the olde worlde village setting, the MicroProse offices are exactly the sort of premises you would associate with a sunrise industry. Downstairs is all split level open plan, and upstairs all skylights and computers.

The skylights provide perfect lighting for Julie Burness-Hand, the



Smiling Stewart Bell . . . right in the shop window

company's graphic designer, responsible for advertising and pack art. Julie is another Cotswold local, but while the rest of us were struggling through the snowdrifts this winter she was off skiing in the Alps.

You don't get let off that easy though. Julie came back with a broken thumb (honest, it was the toboggan ride on the last day) which is not much help at work and has given her reason to be even more sensitive about her double barrelled name.

From action girl to action man; Simon Barnard has impeccable qualifications for managing battle simulation software, as he used to take part in the real thing.

Simon is ex-British army, mustered out just before the Falklands hit the fan. I rather got the impression that he was put out to have missed it, but there is nothing of the Rambo about him, just the quiet confidence that comes from experience.

Simon finally reveals the secret of the sleepy village location. Nip out the back of the "shop" and you find yourself not in a cobbled lane, but in a 5000 square foot warehouse, filled with dexion racks – and they're not empty either.

They are jammed to the rafters with . . . dried flowers, weird lamps, 'objets' – yes, it's the last tenant's stock, not yet moved out. But eventually this will be the centre of MicroProse's distribution.

Marketing and distribution are what MicroProse UK is all about, at least for the present. Most of the product will continue to come from the USA, though a contribution by British programmers is already underway.

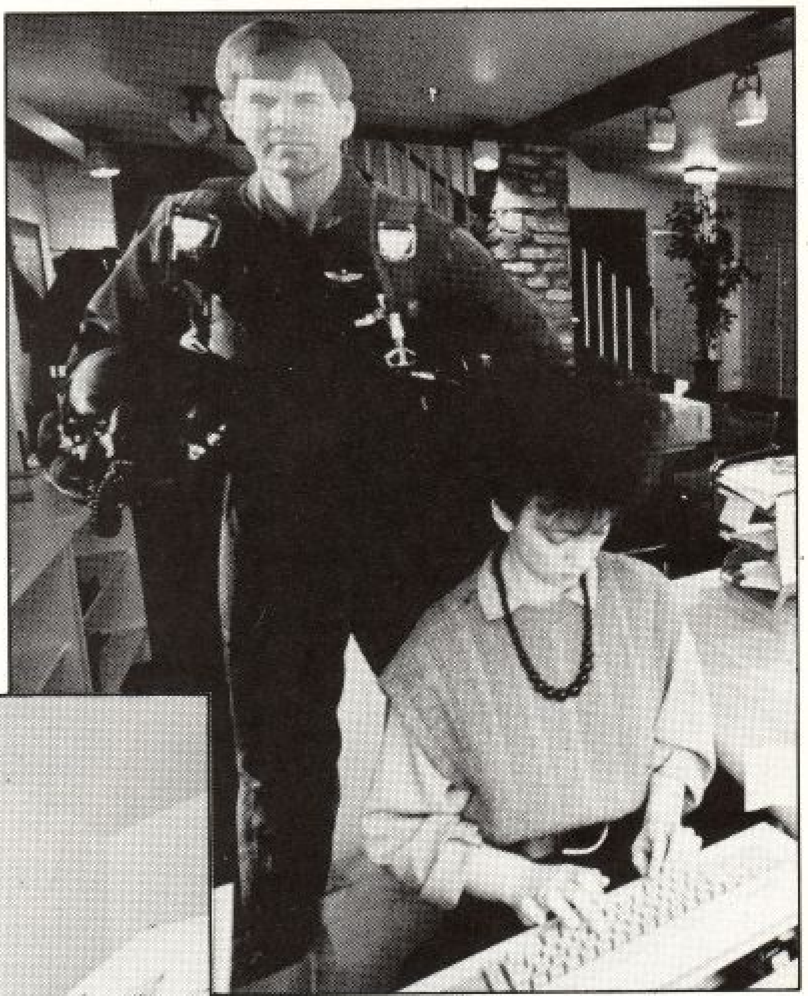
Downstairs the accent is all on marketing. This is where sales administrator Karen Flannery and her secretary Lorna Weeks do their thing, and sales manager John Tweedy keeps a desk there too, though his job takes him out of the office a lot.

Finally there is Paul Rowley, finance manager, to keep track of the cash. It is Paul who was so smitten with the office Amstrad PC that he had taken it home, so I couldn't get a picture. Hope you made out a chitty, Paul.

Stimulation

I am still not clear why F-15 Strike Eagle is not a game. My copy (for the Amstrad PC) says "America's #1 Fun Combat Simulator!" on the front of it, and a sticker reading "Includes Libyan Mission" has been added.

Maybe your average American adult is more playful than the British model. Or maybe they need to be convinced that a program has its serious aspects before they can relax and enjoy it. But a close look at the back reveals that this is the British packaging.



Simulated Right Stuff staffer watches over Lorna



Graphic designer Julie struggles on with Alps-induced handicap

Strike Eagle certainly sticks to the plot. A lot of effort has gone into the realism aspect, in fact it is presented as a flight simulator with armament. No greasy kid's stuff here.

And sure enough, select the Libyan Mission and there is the Gulf of Sirte on your radar plot, with Gadaffi's bunker marked as the primary target.

Up ahead is an enemy aircraft. Bank left, bank right, sight through the headup display, ya-ta-ta ya-ta-ta, gottim! Ooop . . . missile launch warning, better drop a decoy flare. Arm the sidewinders, pull up, immelmann, wheredego?

F15 Strike Eagle should be out shortly on the Amstrad CPCs, but in the meantime it and many other titles are already available for the Amstrad PC. They are actually IBM versions, of course, come over from the land where a PC is just another home computer.

MicroProse looks to do well out of the Amstrad PC. Most British, ah . . . sorry! Most other British software houses have been caught without any entertainment products for the PC, but MicroProse had sufficient to bestow eight, count them, eight PC titles upon me for review purposes.

As these retail for £20-£25 each they constitute a bribe rather greater than union scale even in this business – luckily I am incorruptible.

The other seven PC titles are:

Silent Service: A submarine scenario, looks brilliant on the Amiga (sigh), also available for the CPC's.

Decision in the Desert: Tanks at El Alamein; Monty is on the cover, but YOU are in command.

Spitfire Ace: Defend London in the blitz. Apparently British pilots also have the right stuff.

Crusade in Europe: D-Day to the Battle of the Bulge. Late on parade as usual, yanks. Doesn't Ike look young in his uniform?

Hellcat Ace: Dogfights over the Pacific. So they don't always fight over here.

Conflict in Vietnam: Ooo-er, "Your Personal Time Machine Into History". I pass on this one, being old enough to

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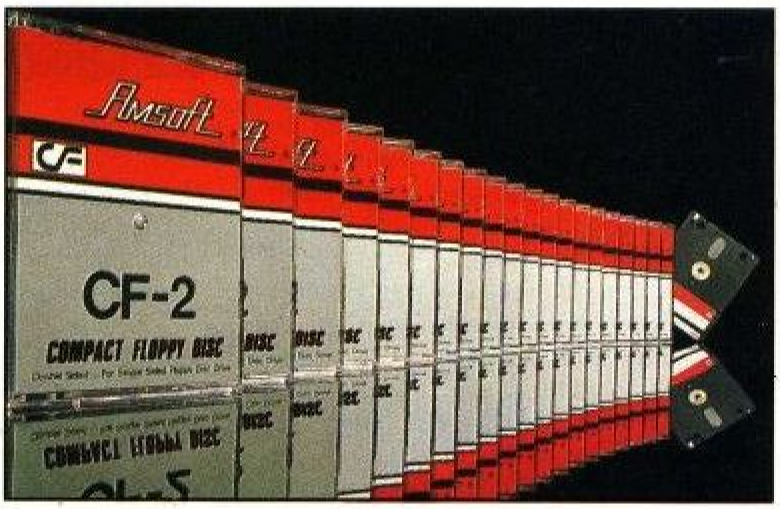
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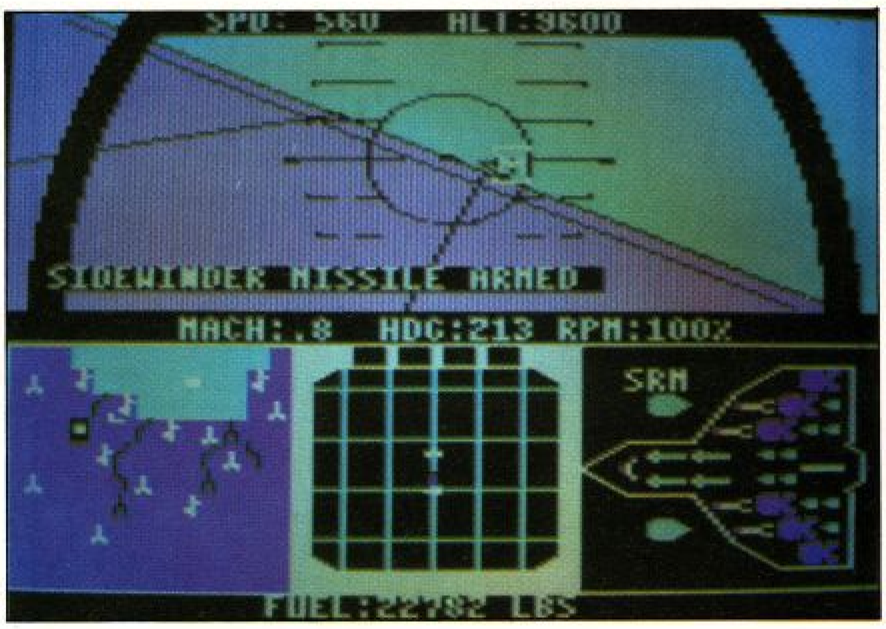
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remember the whole sorry mess. Americans will continue to refight this war, trying to make it come out right. At least this way the landscape doesn't get torn up.

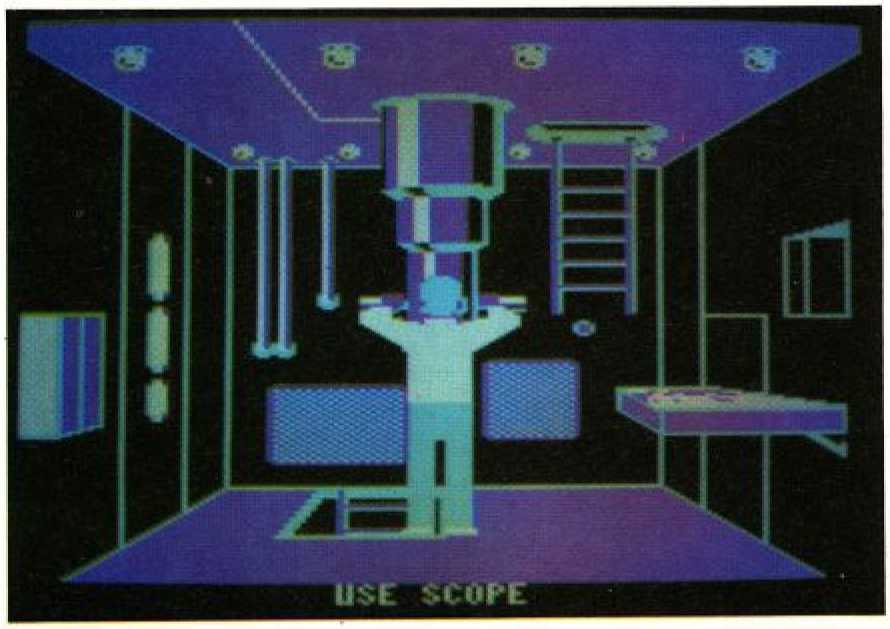
Solo Flight: A real novelty this, a flight simulator with no guns. Significantly, it is also the only scenario of the batch that takes place over the territory of the continental USA. Cessna, the aircraft manufacturers, are said to use this as part of their pilot training courses.

All the above use the IBM four colour CGA type screens, which work fine on the Amstrad, but it is a pity that the IBM standard isn't up to the Amstrad's eight colour, two intensity display.

It is unrealistic to expect all these titles to get a rewrite just to put more colour in the British market, but one can hope for the Amstrad PC to make it big over the water. Then we'll see.



Strike Eagle on the PC1512



Silent Service running on the PC1512

Coming soon

The excitement in the MicroProse office is presently centered on Gunship, a simulation of a helicopter gunship in a, wait for it, combat role.

The Commodore version should be on the streets as you read this, with the Amstrad CPC version coming in July.

This is a big complicated simulation with more features, scenarios and options than I cared to count in what was after all a C64 product.

Still, it looked very good on the Commodore and there is no reason it shouldn't move up on to the Amstrad looking even better.

It cost over a million pounds to develop Gunship. That is more than some software companies have been selling for lately.

MicroProse are sending two British programmers to the United States, whether to learn about the C64 or teach them about the CPC6128 I was unable to ascertain.

One, 22 year old Darryll Dennies, has already gone, the other has not yet been chosen. They will be responsible in part for the Amstrad version of Gunship, and hopefully more to come.

Loading from the notoriously slow Commodore disk drive takes so long you need a loading screen. Gunship's is rather special, with the helicopter rising up into the screen seemingly under its own power.

And all the while an interrupt driven rendition of the Green Beret's theme tune (from Apocalypse Now) cloaks the noise of the drive.

MicroProse have obtained a license for the music, unlike a number of other software companies who are super-sensitive to violations of their own copyright while cheerfully ripping off the composers.

Disc will be nearly essential for gunship, as it is too big, at least on the Commodore, to read in all at once.

There is a C64 cassette version, but I got the impression that this was primarily a concession to the Brits, as Americans all have disk drives.

MicroProse will probably have to redesign their standard pack. The PC stuff comes in a wallet too slim to accomodate a cassette.

More license deals are to come, including a simulation-of-the-book treatment of Red Storm Rising, an Amstrad version being mooted for the end of the year.

The plot involves a Soviet nuclear submarine. Don't worry if you haven't heard of the book, we're sure to get the movie, American literary efforts always travelling best preserved in celluloid.

That dispute

Was not a dispute, according to Simon. US Gold and MicroProse USA had a 30 year contract covering licensing and distribution, but it could be revoked on 90 days notice.

MicroProse gave notice and revoked it, not because US Gold were doing a bad job, but because they thought they could do a better one. And yes, they did know about the Amstrad PC 1512 when the decision was made.

The move brought a lot of press speculation because this was the first time anyone had pulled out of a licensing agreement with US Gold, who are a very successful company. Probably they didn't like it, but that's business.

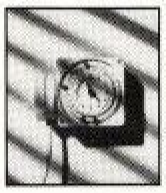
And business is what MicroProse are here to do. Despite talk of financial prudence, they have the backing of a major US company. They have their beachhead well inland, and the personnel to hold it, and most of all they have plenty of ammunition.

They aren't going to go away.

ACU

WHY

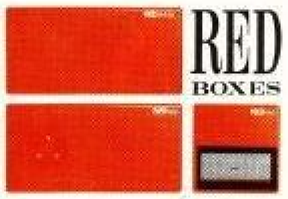
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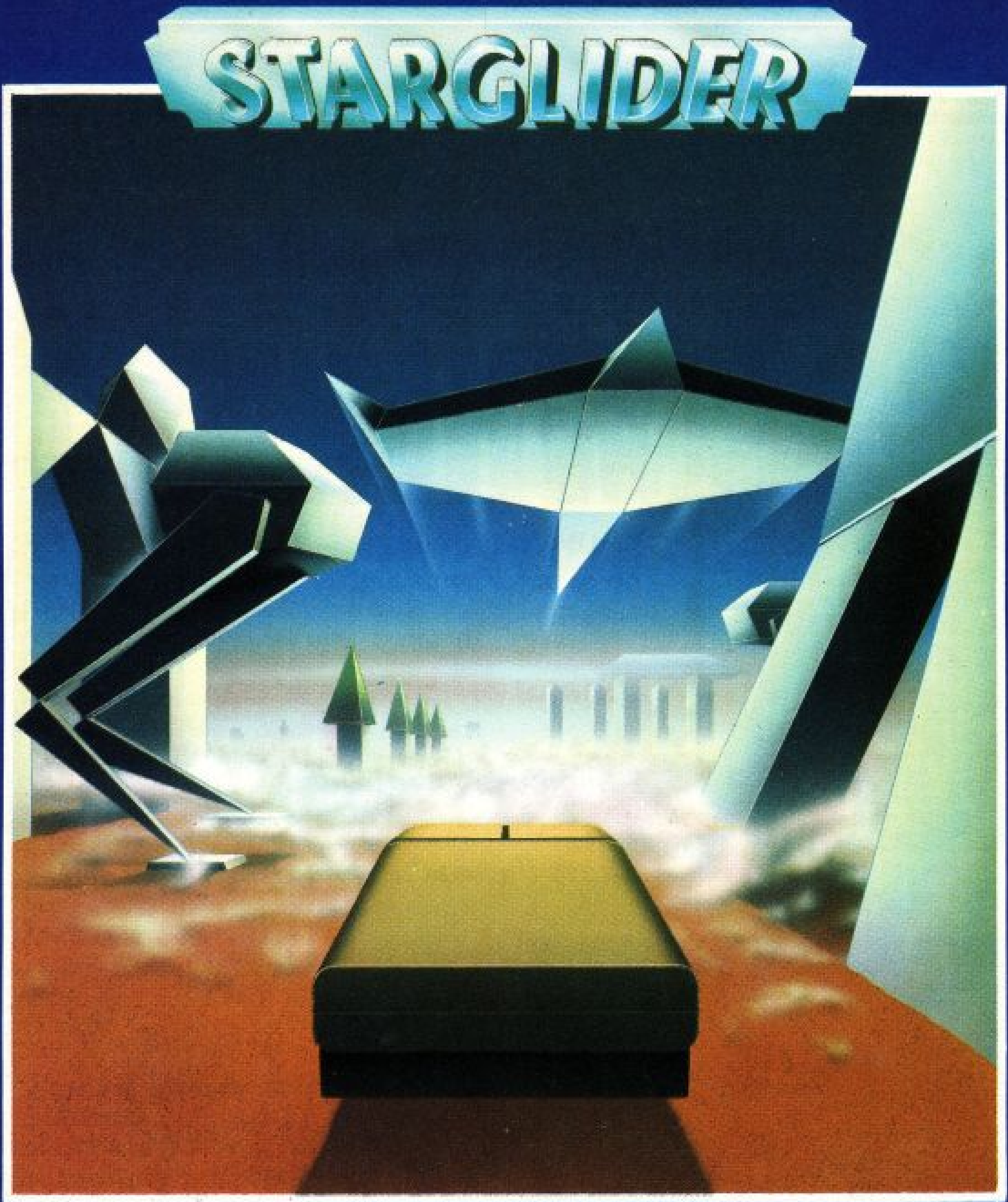
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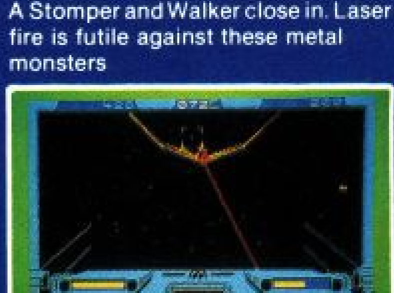
A Stomper and Walker close in. Laser fire is futile against these metal monsters



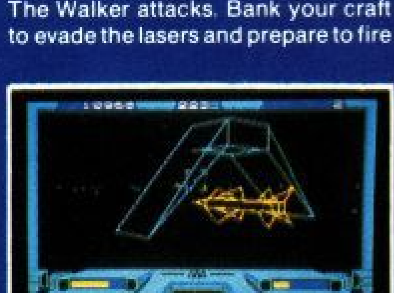
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Vax and Justin are the Bonnie and Clyde of programming. If it's legal they avoid it. Play games with more lives than a gross of cats.

Well folks, another month, another column. Always wanting to try out innovative ideas in computing, I have just finished an experiment to determine if microwave ovens can be used for the bulk erasure of floppy discs. The results were negative, noisy and very messy.

Still, now the smell of burning Maxwell has gone (nothing to do with Wapping), I can get to grips with this column once more; with trusty computer and a mug of sell-by soup at my side.

Sell-by soup? If it was sell-by last January, it goes in the soup.

Anyhow, Justin has revealed to me his greatest problem: The words sleep and holiday do not exist in his vocabulary. This means that this is yet another almost-completely-Justin's column. Not helped by the currently rather emptyish mailbag of late. Come on, fill it!

Poke first, talk later? OK, here's one for Xevious. It gives both you and the other shmuck you conned into giving you a challenge (after practising for three hours solid) infinite lives. It's yet another of the "Rewind the tape to the start and run the below routine" species.

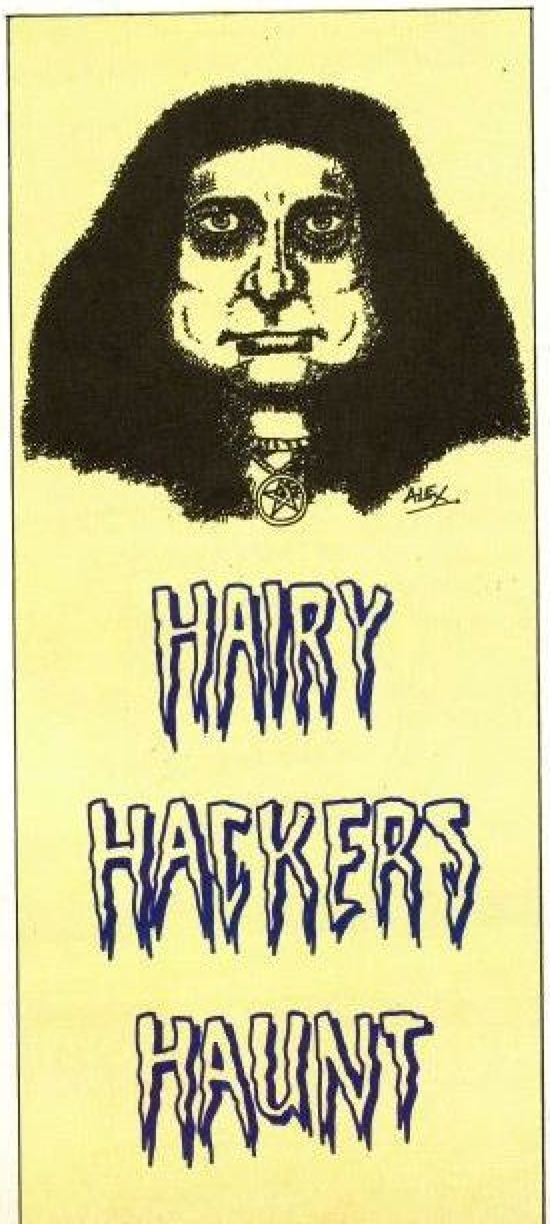


```
10 MODE 1:MEMORY 12345
20 LOAD ""
30 tot=0
40 FOR n=&A700 TO &A748
50 READ a$:a=VAL("&"+a$)
60 POKE n,a:tot=tot+a
70 NEXT n
80 IF tot<>7380 THEN PRINT"This Devious
   Xevious poke has an error  in the dat
   a.":END
90 CALL &A734
100 DATA dd,21,00,bf,11,4f,00,cd
110 DATA 4e,bc,21,c3,1a,11,a7,af
120 DATA 22,1b,bf,ed,53,1d,bf,c3
130 DATA 00,bf,21,00,00,22,ec,04
140 DATA 22,ed,04,c3,1e,bf,3e,a8
150 DATA 21,67,fc,32,00,02,22,01
160 DATA 02,f3,f1,c9,3e,c3,21,26
170 DATA a7,32,e2,39,22,e3,39,21
180 DATA ff,ab,11,40,00,c3,af,39
190 DATA 4a
```

One poke down, another dirty dozen to go. I told you he wuz busy.

Fulfilling my benificial role as an Agony Uncle to programmers, or prospective programmers at any rate, I'll answer a quickie from . . . Ah. Lost the flipping letter. Hang on, here it is. From O. Cunningham of Livingston (more from him next month).

It was about how to get to the strange extra commands that happen by accident on a Z80 processor. These aren't in the actual real kosher instruction set, but work on every Z80 I've come across. Even the one in my Rusty Old Micros 1 (Nascom in a tin box).



The oldest trick in the unofficial Z80 programming manual is that the IX and IY registers can be treated as split-table registers in exactly the same way as HL is.

IX and IY instructions have the bytes DD hex and FD hex in front of a perfectly boring HL instruction. By bunging these bytes in front of an instruction using H or L separately, you can muck with the high or low byte of, say, the IX register.

Now this happens with MOST instructions on MOST versions of the Z80, but this 'aint necessarily so. Also, when disassemblers come across this sort of code in the otherwise ordinarily chaotic "code" we write, they go "ere, wots all this then ?" and go out to lunch. Maxam misses the point altogther and treats it like an ordinary H or L instruction. Hope that answers your query, Mr. wots-yer-name.

Just in time to get back to Justin's pokes, after refilling mug of sell-by soup. Should've turned the gas on low, the soup's getting darker by the mugful. The name of the next game is Future Knight, and here's what Justin did to it. RTTSARR:

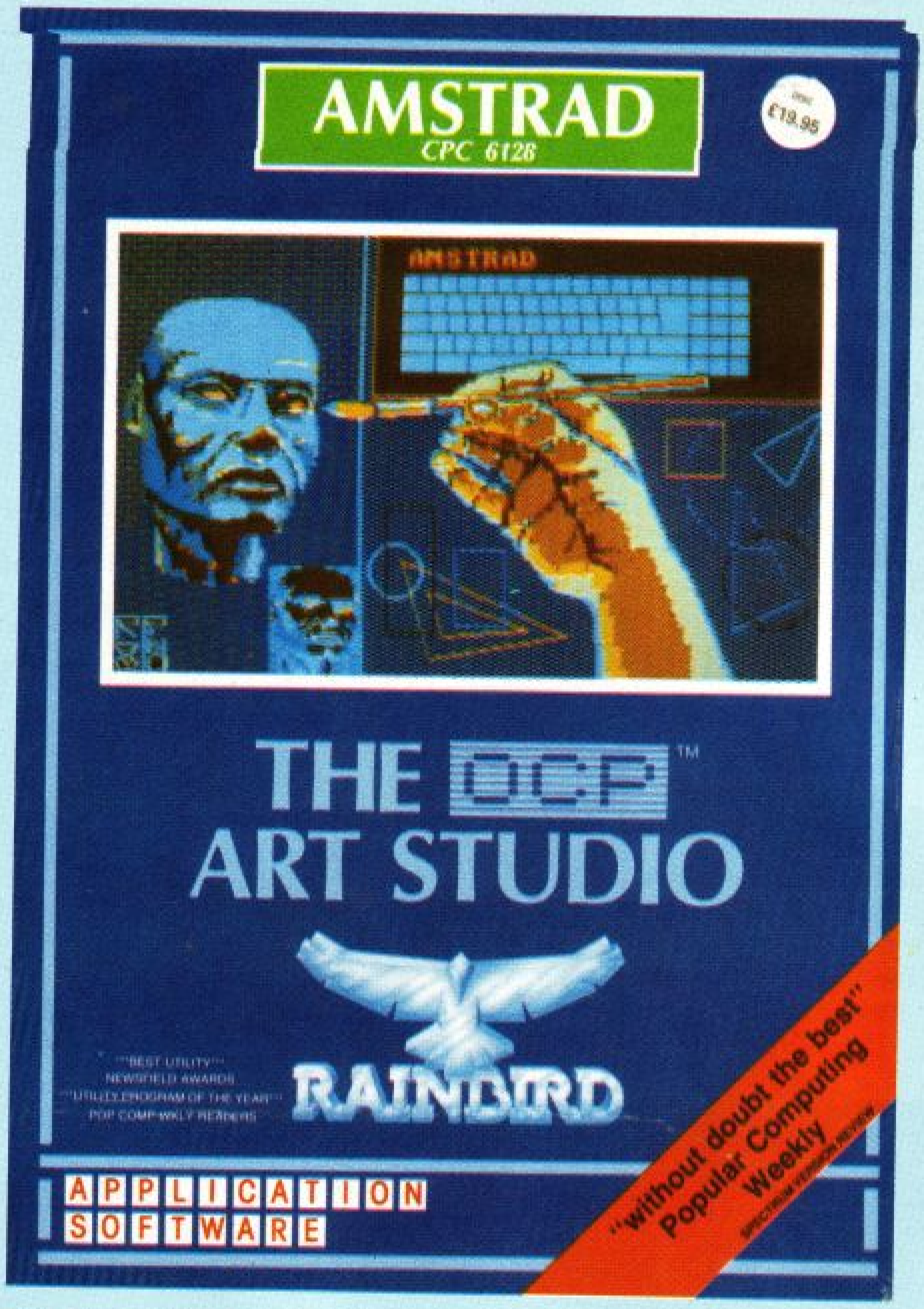
```
10 MODE 1:MEMORY &1FFF
20 LOAD ""
30 FOR n=&300 TO &30C
40 READ a$:POKE n,VAL("&"+a$)
50 NEXT n
60 POKE &208C,3
70 CALL &2000
100 DATA 21,00,00,22,99,07,22,9b
110 DATA 07,c3,00,04,4a
```

It's mistake time. The Locoscript poke in the January issue had S876A 3E C0 00 in it. Each group of digits should

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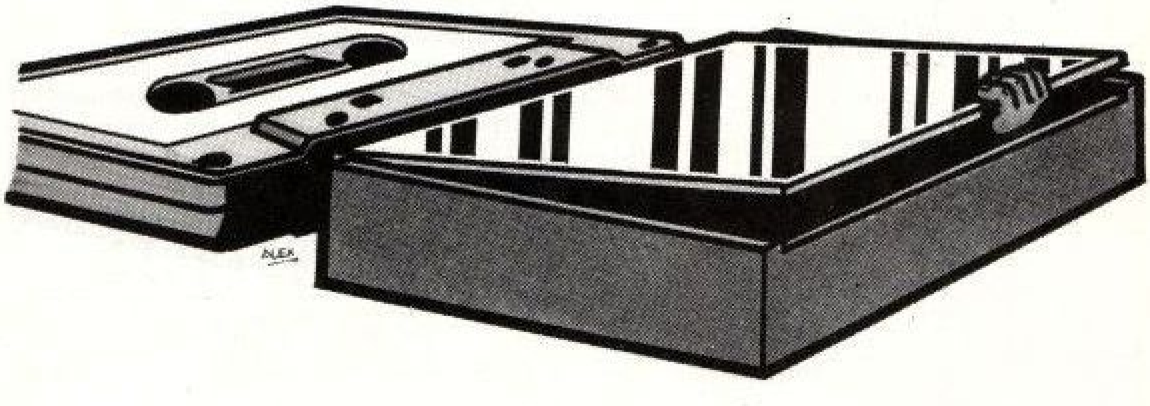
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have been on a separate line, with an extra line at the end.

Dougie Reid of Caithness seems to have found all the misprints ever mispronted in the column, but has got a few of his own, and the following tip for Redhawk (should really be in the adventure column this, but I think I can get away with it):

The mugger is usually to be found in the Park or Town Square. Some of the times are: 10.59, 11.26 Park; 11.53, 12.20 Either of 'em; 12.20, 12.49 Town Square.

Robberies tend to be done by the following:
12.00 Fusor does over the Jewellers.
13.11 Techno is knocking off the bank.
13.35 Rat is helping himself to the contents of the Warehouse, and
16.14 Merlin is nicking the piccys in the Art Gallery.

Cabs cost £5 a throw to anywhere. You need a cab, or to fly, for the following places: Brook Court (to the Editor), Smallman Street (the professor) and Oxford Gardens (to the Director).

He also says that it's not a good idea to give Lesley the film, and that there's a bomb in the power station.

There, that ought to have totally spoilt the plot for most of you. Now for more from Justin, a no-holds barred on Tapper. Your inkeeper is now stout enough to take the most bitter blows, without turning a lighter shade of pale.

Rewind the tape to the start and run the routine, or forward past the first file and run the routine. By the way, due to lack of a cassette version, we're not sure about this one, but it does work on disc. Honest.

```
10 MODE 1:OPENOUT "d"
20 MEMORY &103F
30 LOAD "!tapper.scn",&C000
40 LOAD "!",&1040
50 POKE &570A,0
60 DATA f3,21,40,10,11,40,00,01
70 DATA c0,81,ed,b0,c3,00,80,4a
80 FOR n=&BE00 TO &BE0F
90 READ a$:POKE n,VAL("&"+a$)
100 NEXT n
110 CALL &BE00
```

Back to page 3. Of Dougie's letter that is. He says, and we'll have to take his word for it here, that if you type in "I want to cheat" when it asks for your name, it replies with "Yesum Boss." I think we've done the Equinox poke already, Dougie.

Now for a break with Justin while I fix another snack. Here's Jailbreak broken into, to keep you busy for a while. Both infinite lives and no collision detection in this one.

OK the shrewder amongst you will ask "If there's no collision detection why do you need inifinite lives?" Well, if you want to pick up extra weapons from the civilians then you need to move over them, and the collision detected. So what happens here is that any near collision isn't detected but head on ones are. So there.

Oh yes, rewind the tape to the start and run the routine. By the Great God Glitch, I get bored with typing that.

```
10 MODE 1:MEMORY 12345
20 LOAD "",&A100
30 tot=0
40 FOR n=&BE00 TO &BE27
50 READ a$:a=VAL("&"+a$)
60 POKE n,a:tot=tot+a
70 NEXT n
80 IF tot<>3945 THEN PRINT"error in that
   thar data.":END
90 CALL &BE00
100 DATA 3e,a1,67,2e,02,77,2e,05
110 DATA 77,2e,1e,77,2e,21,77,2e
120 DATA 45,77,21,1b,be,22,39,a1
130 DATA c3,00,a1,af,32,7b,cd,c6
140 DATA c3,32,57,cd,c3,00,f0,4a
```

Moving over civilians reminds me of a bit in the London Evening Standard recently (names deleted to protect the innocent): . . . Police broke up a demonstration at xxx university today, where there had been a sit-in for the past 10 days. The police arrived with sledgehammers and pickaxes, but met no resistance . . .

Cop the next poke from Justin. A small furry creature from Alpha Centuri says: Rewind the tape to the start and run this routine.

```
10 MODE 1:MEMORY 12345
20 LOAD ""
30 tot=0
40 FOR n=&BE00 TO &BE44
50 READ a$:a=VAL("&"+a$)
60 POKE n,a:tot=tot+a
70 NEXT n
80 IF tot<>7048 THEN PRINT"You've goofed
   the Goonie data I'm afraid":END
```

```
90 CALL &BE30
100 DATA dd,21,00,bf,11,4f,00,cd
110 DATA 4e,bc,3e,c3,32,1b,bf,21
120 DATA 18,be,22,1c,bf,c3,00,bf
130 DATA cd,37,bd,af,32,28,47,c3
140 DATA 00,46,3e,a8,32,00,02,21
150 DATA 67,e5,22,01,02,f3,f1,c9
160 DATA 3e,c3,21,22,be,32,e2,39
170 DATA 22,e3,39,21,ff,ab,11,40
180 DATA 00,c3,af,39,4a
```

Question from Suz as H.H. makes a mug of tea. Does The H.H. have literately no talent? Never mind.

'Ere, who put that there? And who wedged paper under the delete key ?

Speaking of sneaky tricks, it's about April Fool's Day out there in the real world. If not, the joke's on me. Anyway, here is a small program to turn the screen on an Airo (PC1512) into black on black. Very legible is that. Boot into a-mess-DOS and type:

```
DEBUG
A100
MOV AX,0124
XOR BL,BL
INT 15
MOV AX,4C00
INT 21
RCX
10
N WHEREDGO.COM
W
Q
```

This saves a program called WHEREDGO on your disc. Cautiously approach your victim's computer when he/she isn't looking, insert your disc and type WHEREDGO at their prompt. Nothing will change yet. Type CLS and all will go very black. If not, type ANSI and CLS again.

As the colours are stored in battery backed-up ram, attempts to reset things by turning the power on and off will fail. To get out of it, boot up off red disc, put in green disc and type NVR, or pull the batteries out (rather drastic approach, resets the clock, ramdisc etc).

More from Justin:

Infinite Energy for the totally

amazing Gauntlet (cassette version. Rewind the tape to the start and run the below routine. (Please note that it will allow you to carry on playing after the health value has reached 0.)

```
10 MODE 0:PRINT"Here we go.."
20 tot=0
30 FOR n=&100 TO &12D
40 READ a$:a=VAL("&"+a$)
50 POKE n,a:tot=tot+a
60 NEXT n
70 READ sum
80 IF tot<>sum THEN PRINT"better check t
   he data lines I'm afraid":END
90 CALL &100
100 DATA 3e,16,21,70,01,11,70,02
110 DATA cd,a1,bc,3e,c3,21,20,01
120 DATA 32,30,00,22,31,00,3e,9c
130 DATA 32,a5,02,3e,6b,c3,ef,01
140 DATA 3e,21,32,a5,02,3e,c9,32
150 DATA 98,8f,c3,a5,02,4a
160 DATA 3814
```

What do you call a man in a pile of leaves? Russell. The one in this column is usually a Stewart Russell, but this time is a Paul Russell. He is after pokes for the CPC four-pack disc versions of Manic Miner, and JSW II. These incidentally run on the 6128, ho ho. The previously published pokes don't work on them, gibber gibber. So I am prepared to lift my embargo on Manic Miner pokes to help out Russell. Anyone care to take it on?

He did give one tip, to make the ESP Light Pen screen dump work with a Star SGX-15 printer. The ESP light pen is one of the better offerings in that area methinks, so I hope this is useful to some of you. Put the following line in their program: 5 POKE 1279,0

That's not a poke, THIS is a poke: (Ackn. M. 'Crocodile' Dundee.)

Infinite Missiles, Energy and shield for the disc version of Starglider. Insert the disc and run the routine below.

```
10 MODE 1
20 MEMORY &1FFF
30 LOAD"k32",&C000
40 LOAD"k16",&2000
50 POKE &6504,0
60 POKE &98C8,0
70 POKE &98C9,0
80 POKE &98CA,0
90 CALL 63232
```

(Don't worry Justin, I got the corrections.)

Now the next episode of Justin, in which he fixes a bug in Konami's Mikie. This is fortunate, 'cos that's what the poke is for.

Rewind the tape to the start and run the below routine, but you'd already guessed, hadn't you?

The bug was that if you load the game normally and press Escape during play the game crashes. This routine causes the game to restart upon pressing escape.



```
10 MODE 1:MEMORY 12345
20 LOAD ""
30 tot=0
40 FOR n=&BE00 TO &BE64
50 READ a$:a=VAL("&"+a$)
60 POKE n,a:tot=tot+a
70 NEXT n
80 IF tot<>11326 THEN PRINT"error. DATA
   ERRATA ?":END
90 CALL &BE45
100 DATA dd,21,00,bf,11,4f,00,cd
110 DATA 4e,bc,3e,c3,32,1b,bf,21
120 DATA 18,be,22,1c,bf,c3,00,bf
130 DATA cd,37,bd,af,32,c3,61,3e
140 DATA b7,32,29,62,3e,c9,32,ee
150 DATA bd,21,59,be,3e,c3,32,be
160 DATA 61,22,bf,61,c3,a8,58,3e
170 DATA a8,32,00,02,21,67,e5,22
180 DATA 01,02,f3,f1,c9,3e,c3,32
190 DATA e2,39,21,37,be,22,e3,39
200 DATA 21,ff,ab,11,40,00,c3,af
210 DATA 39,3e,42,cd,1e,bb,c2,a8
220 DATA 58,c3,c4,61,4a
```

Now Justin will tackle the disc version of Gauntlet with one opcode tied behind his back. When your health reaches zero the game will not finish. BUPA eat your heart out.

Run the routine and follow the screen instructions. Hah! You thought I was going to put the bit in about rewinding tapes, didn't you?

```
60 POKE n,a:tot=tot+a
70 NEXT n
10 MODE 1
20 INPUT "Insert GAUNTLET disc and press
   ENTER.",a$
30 tot=0
40 FOR n=&64 TO &B8
50 READ a$:a=VAL("&"+a$)
80 IF tot<>7154 THEN PRINT"Theres summin
   g rong wiv ther dayta.":END
90 CALL &64
100 DATA 21,a1,00,cd,d4,bc,79,22
110 DATA a2,00,32,a4,00,21,00,01
120 DATA 1e,00,16,00,0e,41,d5,e5
130 DATA df,a2,00,e1,d1,26,03,0e
140 DATA 42,df,a2,00,3e,c3,21,80
150 DATA 03,32,92,01,22,93,01,21
160 DATA a5,00,11,80,03,01,80,00
170 DATA ed,b0,c3,00,01,84,00,00
180 DATA 00,3e,21,21,ff,ba,32,92
190 DATA 01,22,93,01,3e,c9,32,38
200 DATA 8f,c3,92,01,4a
210 DATA end
```

While writing this bit of Hackers, a small furry kitten (with added catnip) has been practising accupuncture on my ankle. Presumably revenge for the time I fed it some chilli as it crept toward the keyboard. This has absolutely nothing whatsoever to do with Justin's next poke about infinite energy and infinite bombs for Glider Rider (ze cassette version.)

Rewind the aardvark to the start and run the routine. Sorry, did I say aardvark? I meant to say aardvark. Wups! Done it again.

```
10 MODE 1:MEMORY 12345
20 LOAD "",&3400
30 tot=0
40 FOR n=&BE00 TO &BE1E
50 READ a$:a=VAL("&"+a$)
60 POKE n,a:tot=tot+a
70 NEXT n
80 IF tot<>2019 THEN PRINT"Error in the
   data.":END
90 CALL &BE00
100 DATA 21,09,be,22,0c,34,c3,00
110 DATA 34,21,12,be,22,24,40,c3
120 DATA 00,40,97,32,09,13,32,14
130 DATA 13,32,df,12,c3,00,04
```

Three more of Justins pokettes to go, and so little to say about them. Ah well,

you can take them neat:

Infinite lives, ammo and keys for Eagles Nest. Rewind the tape to the start and run the routine.

N.B. please leave the message at the end but inform the readers it isn't essential. Thanks.

```
10 MODE 1:MEMORY 12345
20 LOAD ""
30 tot=0
40 FOR n=&BE00 TO &BE45
50 READ a$:a=VAL("&"+a$)
60 POKE n,a:tot=tot+a
70 NEXT n
80 IF tot<>6413 THEN PRINT"Better check
   the data lines.":END
90 CALL &BE00
100 DATA 26,40,2e,cb,36,6a,2c,36
110 DATA 9a,24,2e,87,36,dd,2e,d4
120 DATA 36,99,2e,f2,36,8e,21,24
130 DATA be,3e,c3,32,30,00,22,31
140 DATA 00,c3,12,40,3e,c3,21,32
150 DATA be,32,11,44,22,12,44,c3
160 DATA f5,41,6f,67,32,90,0a,32
170 DATA f0,25,22,f1,25,c6,b7,32
180 DATA a2,19,c3,00,01,4a
190 REM Told you to kill that jumpblock
200 REM didn't I Mr Parker !
```

Merrroww, infinite lives for Streetwise's KAT TRAP (tape of course). Bob Crawford of Dunmurry had a valiant crack at this as well, but it didn't hit the desk before Justin's. I dunno where you can get Enterprise stuff anymore, Bob. Who would want to?

```
10 MODE 1:MEMORY &32FF
20 LOAD "",&3300
30 tot=0
40 FOR n=&134 TO &156
50 READ a$:a=VAL("&"+a$)
60 POKE n,a:tot=tot+a
70 NEXT n
80 IF tot<>2606 THEN PRINT"using this CH
   ECKSUM! i've found an error":END
85 END
90 CALL &143
100 DATA af,6f,65,32,eb,24,32,ee
110 DATA 24,22,ef,24,c3,34,15,21
120 DATA 00,33,11,00,03,01,00,02
130 DATA ed,b0,3e,01,32,59,03,c3
140 DATA 00,03,4a
```

The classic, with absolutely no introduction needed at all, which is why I'm giving it one (GRAMS. Fanfare): Infinite lives for Donkey Kong.

Last one. That's it! All Justin's pokes gone. Ahhh now we can all relax and blast heck out of 13 different games, courtesy of Justin. Give the guy a medal, or at least pay him on time.

Must be off now, I can hear the sound of something gently detonating in the microwave. Must be those eproms I was experimenting with.

But affore ye go, a wee snippet picked up in the Customer Services department: "Quick, a satisfied customer. Have him stuffed." Ackn. J. Cleese.

```
10 MODE 1:MEMORY 12345
20 LOAD ""
30 tot=0
40 FOR n=&BE00 TO &BE49
50 READ a$:a=VAL("&"+a$)
60 POKE n,a:tot=tot+a
70 NEXT n
80 IF tot<>7600 THEN PRINT "Theres an er
   ror in the data.":end
90 CALL &BE35
100 DATA dd,21,00,bf,11,4f,00,cd
110 DATA 4e,bc,3e,c3,32,1b,bf,21
120 DATA 18,be,22,1c,bf,c3,00,bf
130 DATA cd,37,bd,af,32,18,8a,3e
140 DATA c3,32,19,8a,c3,00,60,3e
150 DATA a8,32,00,02,21,67,e5,22
160 DATA 01,02,f3,f1,c9,3e,c3,21
170 DATA 27,be,32,e2,39,22,e3,39
180 DATA 21,ff,ab,11,40,00,c3,af
190 DATA 39,4a
```

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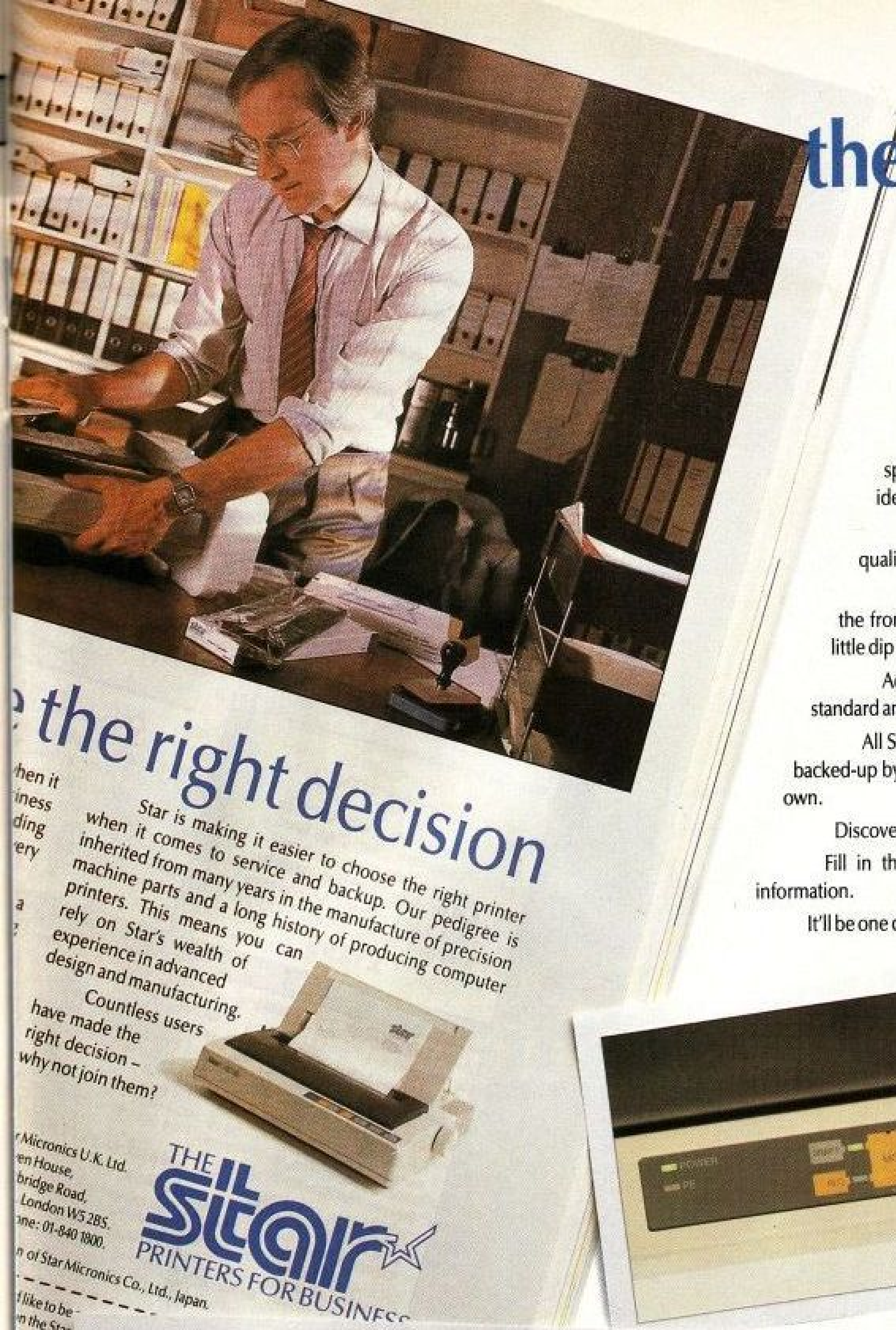
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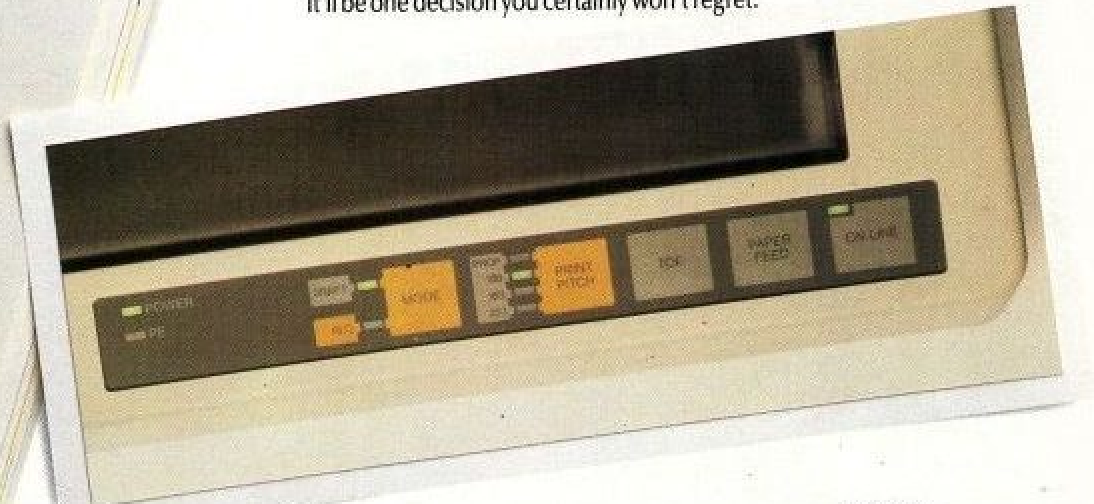
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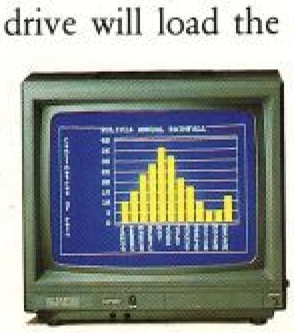
Its fast loading disc drive unit.

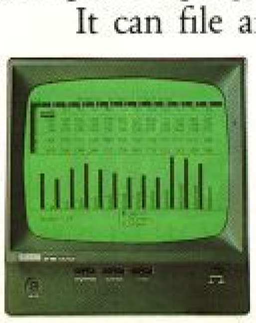
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Opportunity slips by

A new serial interface licensed from Pace replaces the in-house Amstrad design. New it certainly is. But has it been improved? Ian Hoare reports . . .

Before I start, it might be helpful to say what an RS232 serial interface is, and what it can be used for.

RS232 stands for Recommended Standard no 232 and a serial interface is designed to convert the bytes with which the computer deals into a string of pulses one after the other, framed by pulses to tell equipment, to which the I/F is to be connected, where each new byte starts and stops.

Many different peripherals can be connected via your serial I/F, including printers, card readers, modems, and even other computers. It is no exaggeration to say that a serial I/F is the door to communicating to the outside world.

The first thing I noticed about the new Amstrad serial I/F is how small it is (4¼in x 3¾in x 1in) when compared with the previous one.

The next difference is that like all others, including the Pace/Honeysoft I/F from which this one is closely derived, it does not need connecting to the mains, as it takes its power from your Arnold. If you know Commstar, then you know most of the features of this new Amstrad serial I/F.

The I/F comes with an excellent comprehensive 95 page A5 manual, an example to other manufacturers of peripherals and far better than the old "Book of Spells" previously supplied by Amstrad and plugs via a five inch ribbon cable into the expansion port on a 6128 and 664 and the disc port on the 464.

Although there is no through port, the ribbon cable is provided with an extra connector, allowing other peripherals to be connected, though this can be a bit messy.

Once connected, your Arnold may be switched on, and if all is well the I/F signs itself on a Commstar © Honeysoft 1985. The software is on a single 32k rom and the hardware configures it as two 16k roms in sockets 3 and 4.

Fine. But it also configures the sockets as 11 and 12, something which can cause problems later on. This is due to an error in the decoding circuit and means that with a 6128, which can use rom sockets up to number 15, it is impossible to use any other roms in sockets 11 and 12 unless you can switch them off. Even then you would have to keep unplugging the serial I/F whenever you wish to use those two sockets.

On initialising, the rom sets up a series of RSXs, three of which are designed to call complete comms packages. The remaining 13 have to do with configuring and using various functions in the I/F.

It is here that we see that the new I/F is conceived very differently from its predecessor. The number of direct RSXs are fewer and with less emphasis on general purpose RS232 operation.



The old Amstrad I/F had no fewer than 32 RSXs and could easily be set up to act as a remote terminal, for example. The great majority of the most useful commands, however are available in the new I/F either as RSXs, or from within the two main communications programs.

For CP/M users a very important factor must be that the serial I/F is recognised as such by the CP/M operating system, and in this, the new I/F is wholly satisfactory, unlike the KDS and Modem House Svensoft packages.

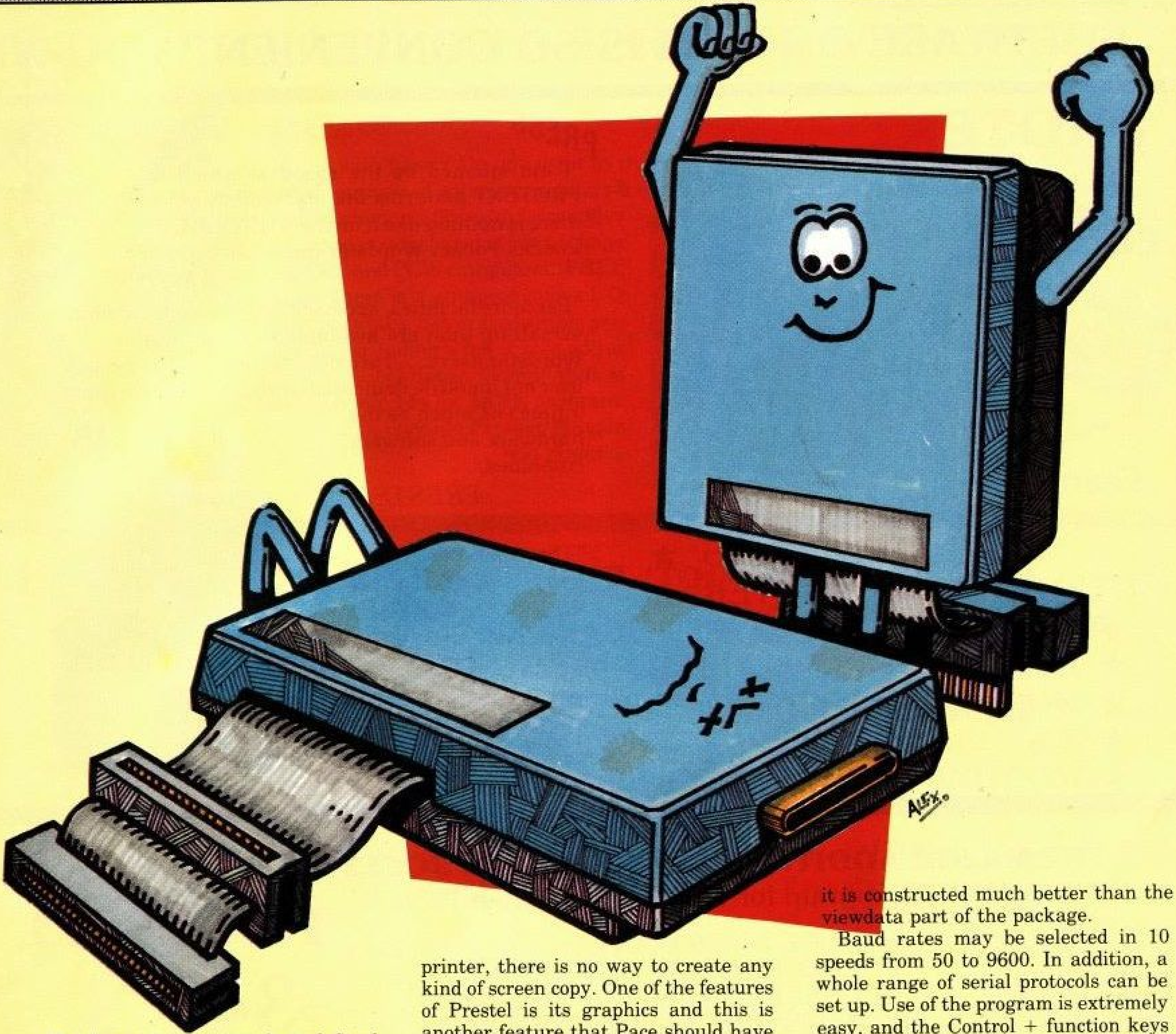
Access to Prestel

The earlier Amstrad I/F incorporated a Prestel emulator, and here we see an enormous difference between the two versions. The early Prestel emulator was frankly pretty awful, with screens being drawn very slowly in several chunks and with very few features. It would not download software from Prestel, and the facilities were very limited indeed.

The new Pace/Amstrad viewdata software, accessed either via a main menu called with ICS, or directly with IHV, is very much more sophisticated. The 10 function keys when pressed with Control all call up windows containing different menus. It has to be said that the use of cursor keys to select menus and sub-menus is somewhat cumbersome.

It is possible to set all parameters and protocols, to load and save screen images, to load and save carousels of 10 frames and, when offline, to view them and edit them.

Downloading is well handled, but the software will not automatically convert the current compacted files, so this conversion has to be carried out later using special free downloadable software.



The function keys may be redefined so that when used in conjunction with the Shift keys, special strings may be sent to the Prestel computer to speed up access to frequently used pages, or to assist in sending mailboxes.

The program works very solidly with few obvious bugs, and is at the moment of writing a very serious contender for the best comms package available for the Arnold. There are, however some drawbacks.

The most serious of these is that it is not possible to create files or frames offline and send them to Prestel. This is a limitation of the original Pace/Honeyview software that has long been criticised and that should have been corrected for this re-issue.

Graphics are not well handled, there being no way to set or reset dots on the screen individually. The only way graphics can be created is to use a process of trial and error. Programs for the BBC and even the Spectrum are available to handle graphics in a much better way.

Although the text of screens can be printed out on any Epson-compatible printer, there is no way to create any kind of screen copy. One of the features of Prestel is its graphics and this is another feature that Pace should have corrected by now.

To make things worse, there is no way to use any other graphics dump routine once you have started the Commstar program. This is not good enough. There are excellent graphics programs available and the Amstrad firmware allows for easy use of RSXs from within roms. There is no reason why the Commstar rom could not call other routines.

There is no facility to set up files to use auto-dial modems, although it is quite simple to send direct commands to a Hayes type intelligent modem.

All these are well known weaknesses in the original Pace/Honeysoft package, and I am surprised and disappointed that at least the most serious of them were not corrected in this re-release as the Amstrad serial I/F.

Access to scrolling boards

This can either be selected from the main menu or via the RSX HT, and is the old Honeyterm program. In general it is constructed much better than the viewdata part of the package.

Baud rates may be selected in 10 speeds from 50 to 9600. In addition, a whole range of serial protocols can be set up. Use of the program is extremely easy, and the Control + function keys carry out broadly similar functions to those set up in the viewdata package.

Apart from normal bulletin board operation, files may be transferred using Ascii or Xmodem protocols. In the latter a minor bug is manifested, in that the software will not send the code to signify that it has finished successfully, and this can cause the host software to hang.

Sending Control+X will usually succeed in persuading it to break out, however. This again is a well known bug, and should have been corrected.

Overall this new I/F is not quite as good as the old one for general serial input/output work, but for access to remote databases, the two main programs, one for terminal work and the other for viewdata, are far more powerful and much easier to use.

It is a great shame that the many good features are marred by the failure of Pace to correct some of the more glaring deficiencies of their old Commstar program.

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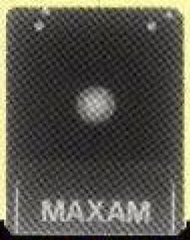
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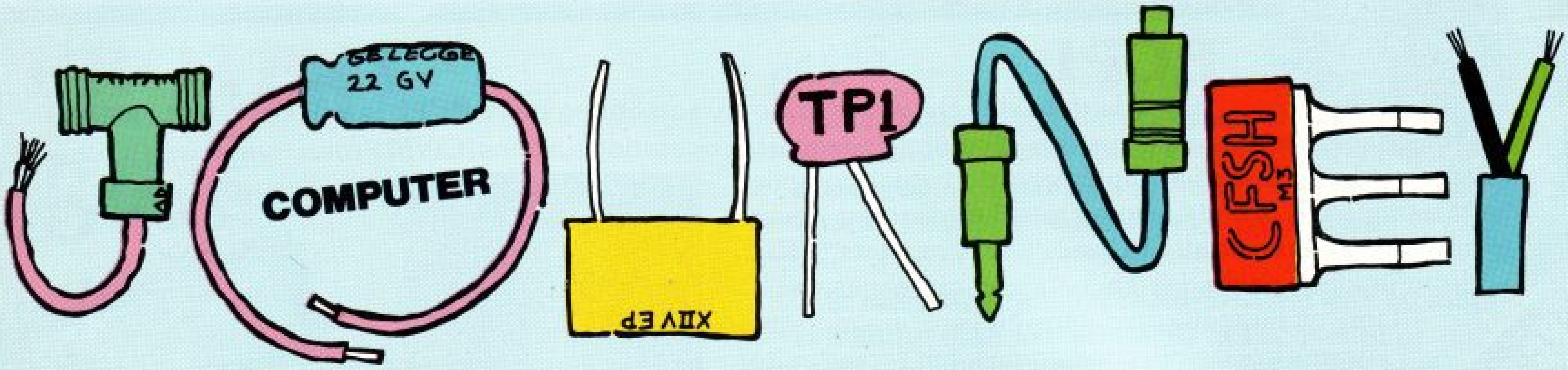
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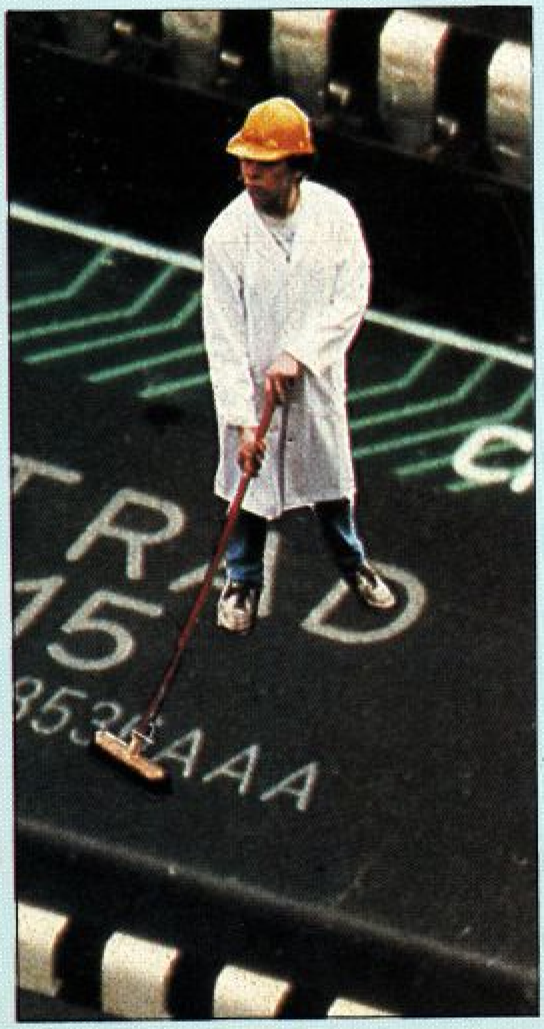
If you've got no curiosity about your computer, and no interest in the technology that makes it possible, then stop now. Go and flick through the games reviews at the back, or drop computing altogether and take up something less 1980's, like mangel-wurzling.

Still here? Ever read those descriptions of computers from the Janet and John school of tuition?

"This is the ROM. ROM stands for Read Only Memory. It holds the computer's operating system. It is called Non Volatile Memory. It is called Non Volatile Memory because it doesn't lose its contents when it is turned off . . ."

Exciting stuff, huh? This article isn't like that (well, bits of it are, but not much). Not only is it about what's in your Amstrad, and how it works, but why.

Let's start with a little history. Around the turn of the century, some of the more unusual aspects of electricity were being explored. The wonderful side effect known as radio waves was studied and wireless was invented.



The early transmitters and receivers were very crude and rather inefficient, just consisting of giant sparks and rather a lot of wire. As wireless developed, devices were invented to increase its range and flexibility – and electronics was born.

First, somewhat surprisingly, was the solid-state diode, the direct ancestor of the ubiquitous silicon chip. Then came the valve, and it was this that got used in the first computers during and just after World War 2.

In the States, Bell Labs invented the transistor. Made from germanium, it was much better in computers than the hot, unreliable, power-hungry valve. Even better was the silicon transistor which followed.

As well as being faster and less fragile than its germanium parent, the silicon transistor lent itself to being combined with other components and transistors on to a single sheet – the integrated circuit or chip.

As computer circuits got more complex, the individual components on a chip got smaller and the whole lot got cheaper.

By the early 70s, it was possible to put all the important bits of a computer on one silicon sliver. By the late 70s, the microprocessor was cheap enough for guys like Clive Sinclair to sell kits of complete computers (1k memory, black and white) for under £100.

By the mid 80s, enough people were buying the things for Alan Sugar to take an interest in the market. And the rest is all your fault, gentle customer.

Living by numbers

Before we embark on a whirlwind tour of your Arnold and the magic that lies therein, you should really have a phrasebook and map so that when numbers start flying about thick and fast you've got a chance of following.

For starters, there's the Z80. This is the brains of the outfit, the consciousness. It does all the thinking and numberbashing that are needed for 2 and 2 to equal 4.

Also known as the microprocessor, CPU (central processing unit, natch) or just processor, it runs programs for a living.

Its sidekick and minder is the misleadingly named ULA. Standing for Uncommitted Logic Array, it was once uncommitted, but it's made its mind up now.

That will be explained later; for now just remember that it handles all the automatic nervous system type of things, like what gets hold of the ram when, timing and associated matters.

The ram (you know this already) is the Random Access Memory. This remembers what it gets told by the Z80, and forgets it, too. The rom remembers what it was told when it was manufactured.

The AY-3-8912 handles the sound and joysticks, the 8255 handles the AY-3-8912, tape and keyboard, and the 6845 handles video.

Finally, there are various little chips which tidy up after the big guys. These are called TTL (Transistor Transistor Logic), or 74 series chips, and are unromantically nicknamed glue. Because they stick everything else together, if you must know.

There are also bit players, like a few transistors, a quartz crystal and a handful of resistors and capacitors.

The capacitors keep the power lines clean and free from nasty spikes and the resistors generally keep external things like the monitor, joystick and cassette signals in order.

They won't get mentioned again, because they're exceptionally boring.

Everything is soldered down on the printed circuit board, which provides all the inter-component connections. And that's it.

The moment of truth

Plug everything in and turn it on. After a bit the screen clears and displays its familiar message. Even to get that far, before anything is typed or loaded in, most of the bits of the computer have to be working.

The Z80 will have executed some seven or eight million instructions in the time it takes to get the monitor (which still uses a valve) warmed up.

The computer's memory will have been checked and cleared, the video circuitry set up to produce a TV-type picture, the sound and keyboard stuff cleared and got ready and the Basic started, ready for your first keypress. You should feel honoured.

For that all to happen, about 200,000 transistors in some 25 different chips have had to switch on and off in synchronisation, some as fast as 16 million times a second. If some switched on at the wrong time, even for a thousandth of a second, then everything would either not work or fry a little.

But every time you switch your computer on, it works. How? It's all a matter of timing and communication. All the cleverer chips in your CPC 464 have a reset line going into them.

Line, by the way, is just about an equivalent word to signal to a digital engineer who'll use the two terms fairly interchangeably. In effect, a line is an electrical connection going into or out of a chip with a unique function.

In a modern microcomputer, lines tend to be digital. Digital signals are either high voltage (five volts), or low voltage (zero volts).

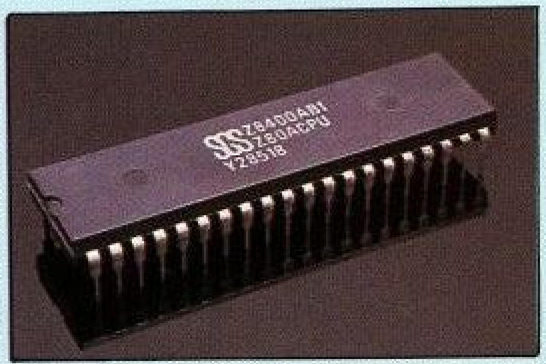
One signal can represent either one or zero – surprise – and two lines can count up to three. Both lines low – zero. First line high, second line low – one. Second line high, first line low – two. And finally, both lines high means three.

Somewhat confusingly, zero to three counts as four separate numbers, as zero is just like any other number to your average (innumerate) hardware engineer. All this is a manifestation of the computer's favourite type of number, binary.

Wait for it . . .

The reset line is digital and not surprisingly resets the circuitry inside a chip. It does a bit more than that: it actually stops the chip from working until the reset signal is removed.

This is important, because you don't want anything to try and get going



Z80 . . . instructions by the million

until everything it depends on is ready for action. Like starting a car with the brake pads disconnected, it's not one of the truly great ideas of our time.

And everything inside a computer is connected with an almost indecent closeness to everything else. As well as sharing the power supply, just about the lot is hooked up to things called busses.

Bus is a term for a collection of digital signals with almost identical function. On the printed circuit board, the signals are carried about by tracks, so the busses look like a bunch of tracks scurrying between chips.

There are two (or three, depending on outlook) of these busses, the address bus and the data bus.

The third is sometimes called the control bus, but most microprocessor designs tend to think of this one as a loose association of separate signals. The first two have 16 and 8 signals on them respectively.

The 16 signals on the address bus, called A0 to A15, combine to make a number between 0 and 65535 (the well known 64k) but in binary of course.

This number is used by the Z80 to select an address and somewhere else on the bus (such as somewhere else on the circuit board, connected to the tracks) is a bit of circuitry which will respond to the address and start talking. Uncannily like someone dialling a telephone number to speak to a friend.

Propping up the bar

Electronics bods use a special form of notation to describe lines. They use lines in the text. Bars over the name of the line indicate that they are referring to buses. Like this: District & Circle line.

The talking itself, be it a command or some information from the Z80 to the lump of silicon it's just woken up or vice versa, floats down the data bus.

These eight lines of magic can only hold binary numbers in the range 0 to 255, but as most of the computer is designed to use these sort of numbers (strange, that), it matters not. Eight bits – 0 to 255 – make up the legendary byte of computer folklore.

The control bus is a bit more varied. To keep everything in order there are a number of signals. Most of them are generated by the Z80 in an attempt to make the right bit of silicon sit up and beg when its name is called.

Most important are lines such as:

$\overline{\text{R/W}}$

which is low when the Z80 wants to give something a piece of data (write to it) and high when the Z80 wants to read a value from something.

There are also interrupts (of which more later) and clock signals which keep everything working at the same rate.

Another much-used pair of lines are:

$\overline{\text{MREQ}}$

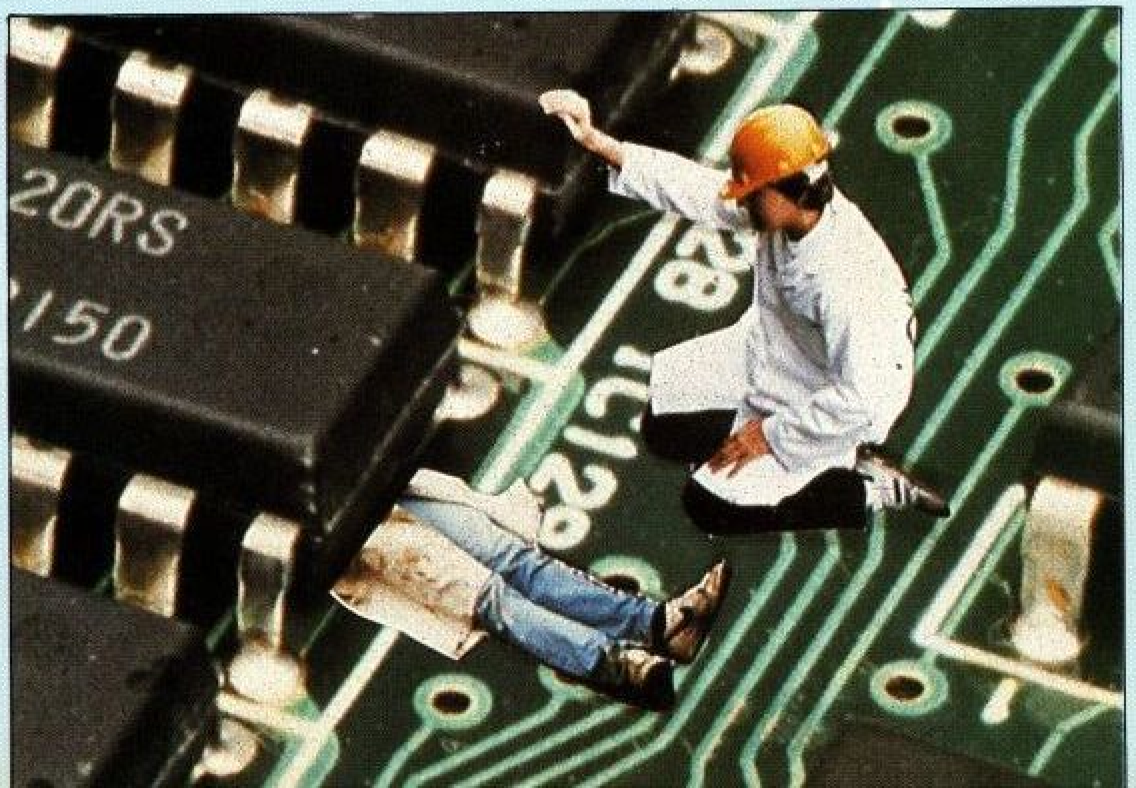
and:

$\overline{\text{IORQ}}$

which work independently of each other.

$\overline{\text{MREQ}}$

(Memory REQuest) is low when the



Z80 intends to read or write from a memory device, like ram or rom.

$\overline{\textbf{IORQ}}$

(Input/Output REQuest) is low when the desired device is something to do with input/output, like the sound chip or the printer port.

These lines are never both low at the same time, as both input/output and memory chips are otherwise hooked up identically and there could be a little bit of confusion.

As everything is connected to these two busses, you can see that it's important that only one thing tries to put a number down them at one time.

If two different devices tried to put two different numbers on the data bus at once one would probably win – and one would probably blow up. This sort of thing, called contention, is really to be avoided at all costs.

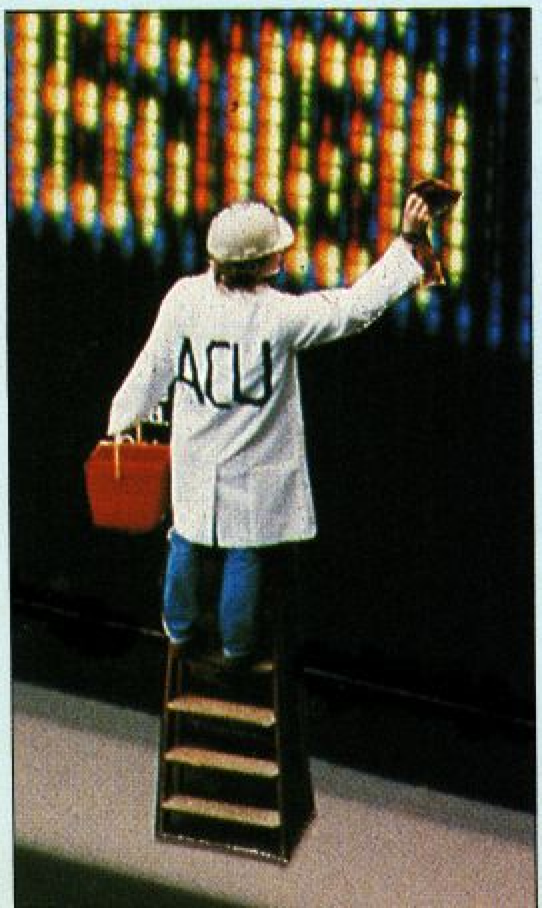
A zone of contention

There are situations where contention can't be totally designed out. The classic problem on a microcomputer system where some sort of TV picture has to be produced is video contention.

Inside the computer's ram is an area where the microprocessor draws patterns which correspond in some way to a picture the human user wants to see on the screen.

TV pictures are very regular, precisely timed creatures. They have to start at just the right moment, draw 625 lines in 62 millionths of a second each and start the whole process again exactly one fiftieth of a second later. Nothing can get in their way.

In the Arnold, the chips that have the responsibility for creating the picture are the ULA (of which more later) and the 6845.



The latter imaginatively named/numbered chip must be able to get at the bit of memory it needs exactly when it needs to. Trouble arises if the Z80 is writing to the memory at the same time – who gets control?

If the Z80 gets its way, then the 6845 will have to wait and the TV picture will get disrupted. If the 6845 can overrule the Z80 then the picture will be displayed but whatever the Z80 was doing will have to wait.

And it's not always easy to stop a Z80 in its tracks without confusing the poor beast.

Usually with a home computer (the theory goes), the user would rather have a pristine alien to kill, even if it gets zapped a little more slowly, than one viewed through a bad blizzard. So the 6845 gets to win, every time. And the Z80 is slowed down a bit.

The clever bit of Arnold's design is minimizing the slowdown effect. The Z80 is structured inside in such a way that it can only spend some of it's time reading memory.

The rest of the time it's working out what to do with the numbers it's just got, where to put the result when it gets it and where to go next. During this time the memory isn't being used and the 6845 can sneak a glance without anyone minding in the slightest.

There would normally be times when the Z80 would want to look at memory at just the wrong moment, but the ULA knows about this and fiddles (in quite a sophisticated manner) with the signals that control the Z80 so this never happens.

The ULA runs the house

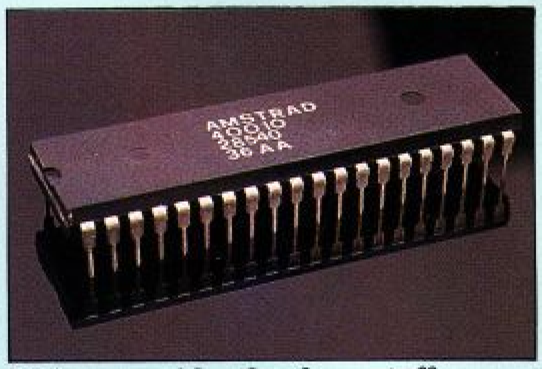
The ULA is responsible for most of the clever stuff that makes an Arnold unique hardware-wise and cheap to produce.

As mentioned earlier, ULA is a misnomer. ULA's are a bit like roms, in that up to a stage in their production they are uncommitted. Just a standard pattern of transistors hooked up into bigger standard patterns of logic gates.

Logic gates are the workhorses of the microcomputer, they make very simple preprogrammed decisions. Like "If the processor says it wants to talk to an input/output chip at address &EFFF then I'd better wake up the printer chip".

To cope with all the possible permutations that the processor and silicon ensemble might get up to requires an awful lot of logic. Fortunately, there's an awful lot of logic in a ULA.

Just before the ULA is finished, a special layer of connections is put on to the chip. This configures the logic gates on the chip so they'll deal with all the bits that make up an Arnold.



ULA . . . provides the clever stuff

The same chip, with different connections, could control a Spectrum or a washing machine (one has better graphics, but which?).

The same process helps stop unethical competitors from producing a clone of a machine. If all the clever stuff is hidden in a lump of plastic-encrusted silicon, it gets very difficult to duplicate.

Shepherding the ram

As well as keeping the house in order, the ULA also does certain specialised functions which the Z80 never notices.

For starters, the ram chips in an Arnold are complex beasts, and rather forgetful. If all the addresses in them aren't looked at every four thousandths of a second or so then the contents are apt to be lost.

To add another layer of complexity on what was once a nice simple idea, the addressing of the locations is by means of a trick involving rows and columns.

There are eight ram chips, one per data line. Each has 65536 individual bits in it, or one for every possible combination of the 16 lines of the address bus. Altogether, they make up those 64K bytes that Arnold owners used to be able to boast of way back when 64K was a lot.

But the chips only have 16 pins, which after the address lines only leaves roughly zero for such necessities as power, earth, read/write and yer actual data.

In truth, each of the 64k locations in each chip sits on a large grid of 256 columns and 256 rows, which adds (well, multiplies) up to 65536 intersections. At each intersection is a bit of memory.

To get at one of those bits, the row number is fed into the chip. As it's one of 256, the chip only needs to be fed with an 8 bit (remember) number, so it only needs eight lines, and therefore eight pins, for the row.

The column number follows after the row-number. By a bit of clever design,

the same eight pins are used for the column, as there are two separate pins (called RAS and CAS – for Row Address Strobe and Column Address Strobe) which tell the ram chip which number is on the eight pins at the moment.

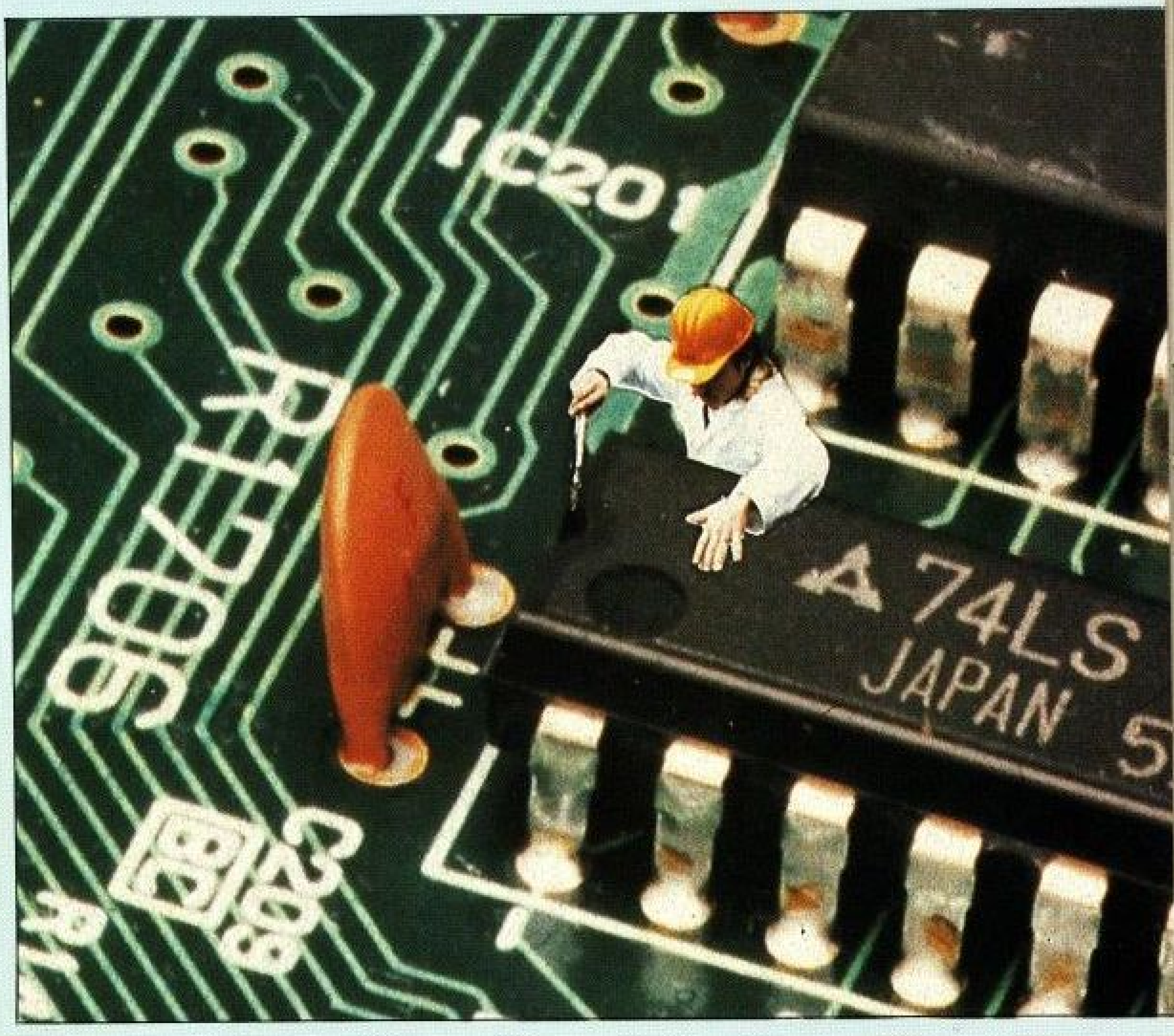
Strobe is the posh electronic word for "read this number in, squire" and is mostly used when repetitive signals are being dealt with.

When you consider that these two numbers have worked out, fed to the ram chips, and allowed everything to settle down afterwards, (in between the processor asking for an address and being ready to read in the contents that sit there), you can see that things have to move at a fair old lick.

The whole sequence is gone through more than a million times a second and the ULA (with a bit of help from some of that TTL stuff) does it all and chews gum at the same time.

On the brighter side, the ULA also handles things like the colour palette, which is the technical trickery that allows you to choose your eight (or four, or two) colours from a list of 27.

Colour handling is pretty clever overall and is the result of some intimate communion between the ULA and the previously mentioned, much acclaimed 6845.



Star of the small screen

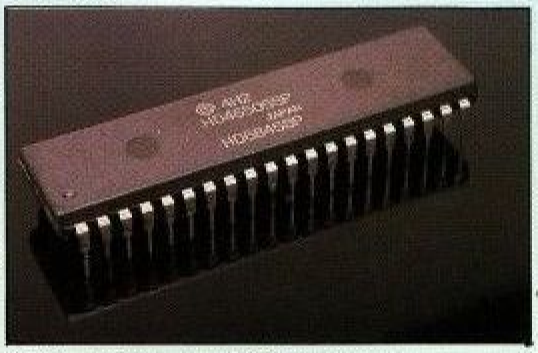
The 6845 is a very accomplished bit of design. It's been used in many famous computers (IBM PC, BBC, Memotech (who?)) and to describe it completely would take several ACUs worth of paper and be mind-numbingly dull to boot.

In essence this wunderbar chip takes a chunk of memory (exactly which is dictated by the all-powerful ULA) and reads one bit of one byte.

Depending on whether that bit is high or low (and on the screen mode) it makes one of its output lines high or low. It then shifts along by one and reads the next bit in the same way.

This is all done in time to the TV signal, so each bit (in mode 2) corresponds to a dot on a line of the TV screen.

This signal then goes to the ULA, which decides on that day's colour and generates the RGB signals appropriately.



6845 . . . just wunderbar

RGB? Red Green Blue, the three primary colours which can combine in any way you please to make any colour you please.

So if you're in Mode 2 and have set a colour scheme of sea green ink on magenta paper (such taste), then the ULA will set the mix of red, green and blue to sea green (mostly green with a hint of blue and no red) if the bit of memory the 6845 read was set to 1. And to magenta (red and blue with no green) if it was zero.

The 6845 can be set to do different things. Like a lot of fairly smart chippery (like the ULA, like the AY-3-8912, like the 8255), it has a set of internal registers which tell it how to work.

One might tell it how many lines there are in a TV picture, or the number of bytes of memory there are to a line, or the length of TV line in millionths of a second – all the sort of thing that keeps users happy and zapping nasties.

And in different modes, some of the data that gets read out of the video ram is used to set the colour of each pixel.

Of course, the three screen modes that Arnold allows are just scratching the surface of pixel possibilities.

The keen experimenter can program the 6845 into some truly convoluted modes, like the Mode 3 that was mentioned in *ACU* some months back, or the Spectrum sized screen beloved of software houses producing a quick conversion.

But mostly people stick with the selection that Mr. Sugar gave them.

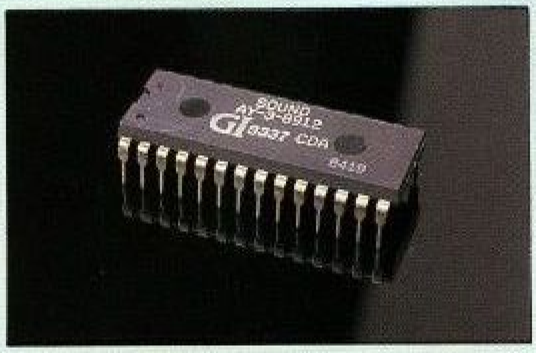
Sonic circuit – the noise boys

Sound is more fully exploited, because to some extent there's less to it. The AY-3-8912 (or 8912 to its friends) is a much simpler chip to understand and use than the video circuitry.

It has three voices, which can play notes independently, an envelope generator (makes things go Ping!) and various noise options.

For reasons of timing, it isn't that easy to hook an 8912 up to a Z80 circuit, as it can be a bit fussy about exactly when it gets its information.

As a result it is one stage removed from the main address bus. In between sits the 8255 chip, the infamous Periph-



AY-3-8912 . . . three voices

eral Interface Adaptor.

The Z80 sends the 8255 the command for the sound chip and tells the 8255 to get the command ready. The Z80 then tells the sound chip that dinner is served.

If the processor tried to do it directly, by the time the 8912 realised that things were cooking the Z80 would have moved on to pastures new and not a peep would ensue.

Unlike the 6845, the 8912 never has to look at the main memory of the system. The Z80 sends a series of instructions and until the next lot the sound chip just obeys the orders.

These are along the lines of "turn on channel A with a frequency of 440Hz, mix in channel B and make channel C produce some noise which will go via the ADSR".

The ADSR function of the 8912 stands for Attack Decay Sustain Release, and is an attempt in hardware to make the synthesised noises a bit like real life.

This is based on the observation that a note's volume (as produced by a pukka instrument) starts life at a certain level, then moves fairly rapidly to a new level (attack phase), followed by a swift change (decay), a bit of a holding on period (sustain) and then a natural death (release).

The functions in an 8912 are a little limited, in that a note can start loud and die away, like a harpsichord or bell. Or it can start quietly and get louder, like a backwards harpsichord or lleb, stay at a fixed volume like an organ, or do unholy mixtures of the three repetitively, like a 8912.

Arnold has a little more flexibility, as more complex envelopes can be generated in software. The sounds that the 8912 generate aren't beefy enough to drive a loudspeaker directly, so they go through a common-or-garden amplifier on their way to the little loudspeaker hidden away within.

The little wheel – spokesman?

Also stashed away within the 8912 is an 8 bit I/O port.

This has got nothing to do with sound production, it reads in 8 bits of information from somewhere – it happens to be the keyboard – and gives them to the Z80 when it asks for them.

It could do it in the other direction if asked, but in the Arnold this never happens. It happens to the 8255, though.

Compared to its brighter, flashier brothers, the 8255 seems to have been left out of it a little. Well, it is a wee bit boring.

It's silent, colourless and just there to hook everything else up in a sensible fashion. Good, no-nonsense silicon, it takes the hard work out of putting the right voltages on to and off the keyboard. Of which more later.



8255 . . . no nonsense silicon

It also reads the LOAD and provides the SAVE signals and is responsible for getting the motor going. Chauffer, so good. It also interacts with the video circuitry, telling the Z80 when it's safe to update the screen with no fear of flicker.

Other odd jobs handled by this pivotal peripheral include handling the expansion port and setting various options, like what the copyright message is when the computer gets going.

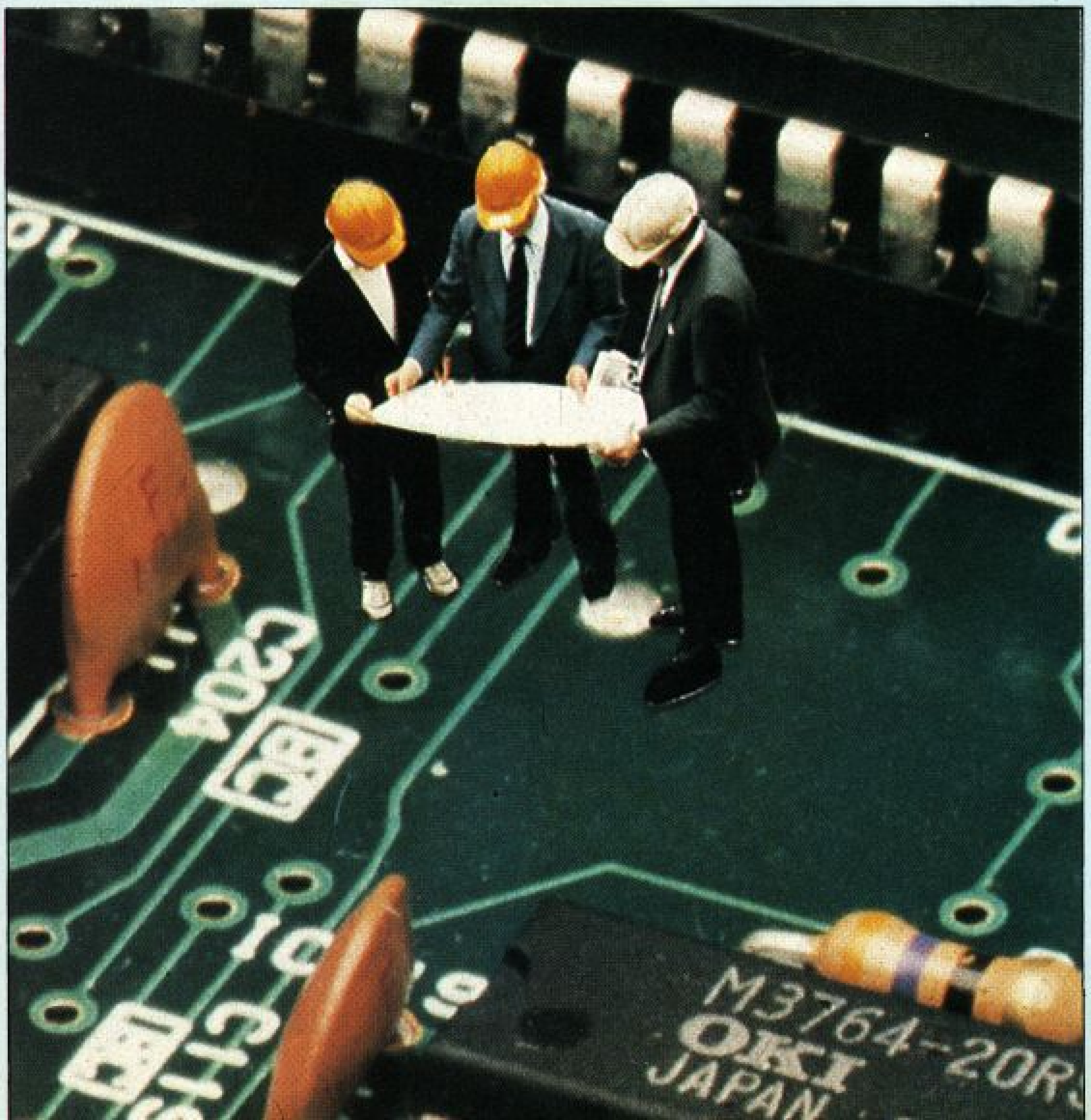
Check it out brains

Which leaves the star of the show, the not so humble Z80. In fact the Arnold uses a Z80A, but it's just the same as a Z80 – it just goes a bit faster.

All through the above, it's been referred to as the chip that pulls the strings in the right order, makes decisions and generally keeps everything ticketty-boo. Which begs the question somewhat – how does it work?

The Z80 has a wide variety of different circuits hidden away inside its little 40-pinned black body.

There's bits to do the maths and take the decisions, bits to work out what to do next, bits to fetch and carry and bits to hook everything up to the world that lives outside the 40 pins. But in a day in the life of a processor, this is what happens . . .



The race is on

First, when the power arrives or Reset is released, clear all the registers. The registers are slightly different to those on the 6845 and co. They are treated more as very fast and very specialised memory locations which the Z80 alone has access to.

Among these registers is the program counter, PC, which contains the address of the memory location which has got the next instruction for the Z80. The PC, like the rest, gets set to zero.

The Z80 obeys instructions without fail. After the reset, its first act is to read in a byte of data from location zero. This byte is then decoded and the

Z80 obeys its dictum.

The decoding is a hugely complicated process and could result in the processor having to jump to a new address, copy a value in memory into a register, or do some maths. Or none of the above, but the Z80 has to decide fast.

If the instruction says "Go to a new address and continue from there" – the jump – then the Z80 has to read in two more bytes of data from the memory, put them into the PC and start all over again.

The reading in of memory is hectic in itself. The Z80 puts the address it wants to read on to the address bus.

It then, depending on circumstance, makes either:

$\overline{\text{MREQ}}$

or:

$\overline{\text{IORQ}}$

low, so the appropriate bit of hardware knows that it's got to provide the Z80 with an instruction to decode. 99 times out of 100 it's the memory; rom or ram.

$\overline{\text{R/W}}$

is low, so whatever it is puts its data on the data bus and the Z80 reads it off. While one part of the Z80 reads and decodes this data, some other parts are working out the next address and preparing to set it up.

All this depends on the main timekeeper, the system clock. The Z80 needs a regularly changing signal to keep its house in order. Tick – set up the address for the next instruction. Tick – read in the instruction. Tick – analyse it. Tick – act on it.

Say, for example, that the instruction that the Z80 gets tells it to take a number away from a register and to jump to a new address if the register gets reduced to zero by the subtraction.

First the subtraction itself has to be carried out and some circuitry inside the processor has to decide whether the result was zero. The circuits which work out whether to jump must work after the subtraction, else they might use an old value before the subtractor has had time to finish.

Similarly, the part of the Z80 which loads in the new address has to wait until the jump/don't jump circuit has finished deciding. In the meantime, it has to get the next address on the assumption that the test will fail.

Keeping order

If everything wasn't tightly sequenced and didn't all happen on a clock pulse, it isn't difficult to imagine that the whole system could fall over in fewer microseconds than it takes to buy *ACU*.

The system clock comes, of course, from the ULA. In case you hadn't guessed, absolutely everything that keeps Arnold on an even keel comes from that ULA. It gets its main timing signal from the quartz crystal, which it uses to work out all the rest of the times from. So it's pretty constant.

It is possible for the device the Z80 is asking to nab a bit of time if it needs it by waggling a signal – called

$\overline{\text{WAIT}}$

– until it's ready. Good designers try and avoid this, as logically enough it slows things up.

In the Arnold, the only device to use this mechanism is the long suffering ULA, which uses it for the clever time-juggling between the Z80 and the 6845.

In general, the Z80 gets the data it wants when it wants it; it uses it as it will and continues on its way.

Some of the instructions it will get don't require any new data at all. "Add two registers together" is a good example, since the data is already inside the chip.

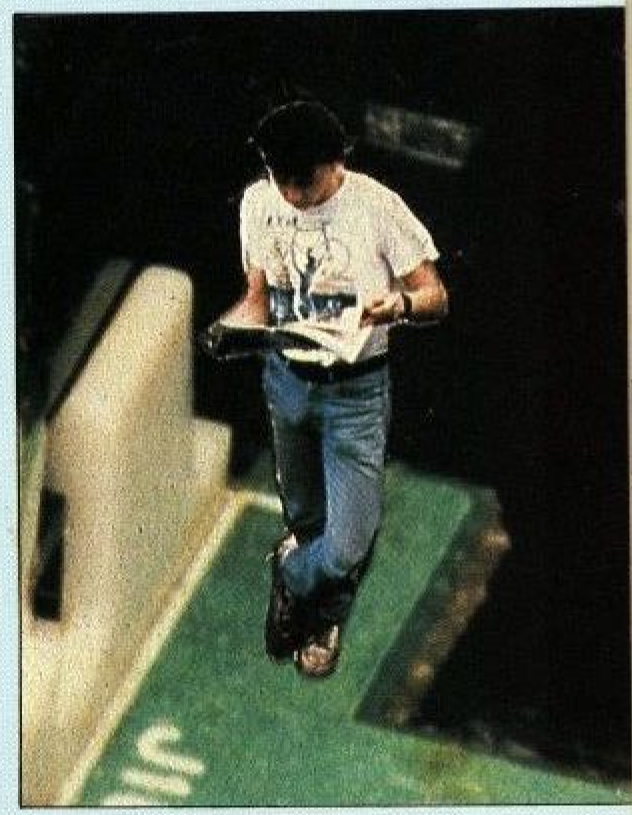
Others only need extra data sometimes, like "Jump to a new location if the last thing you did produced a negative result". Some always need extra data – "Load 42 to this register".

In any case, the Z80 has to work it all out and proceed with the next instruction forthwith. Unless something unusual happens . . .

Expect the unexpected

Interrupts are unusual, and they happen 300 times a second.

An interrupt is the way in which regular timed occurrences can be guaranteed to happen on time. In effect, they are signals that tell the Z80 to stop



what it's doing immediately and run a bit of code somewhere else. When that's finished (and not before, mind), the Z80 can get back to where it left off.

There are two types of interrupt which interest a Z80. One kind are high-powered, unignorable and a bit too nasty for an Arnold. These are called non-maskable interrupts, but aren't used.

The second type are called maskable interrupts, because the Z80 can ignore them if specifically told to do so.

The ULA (of course) generates one of these interrupts every 300th of a second, and the routines so invoked cope with sound queues, Basic EVERY . . . GOSUBs and so on.

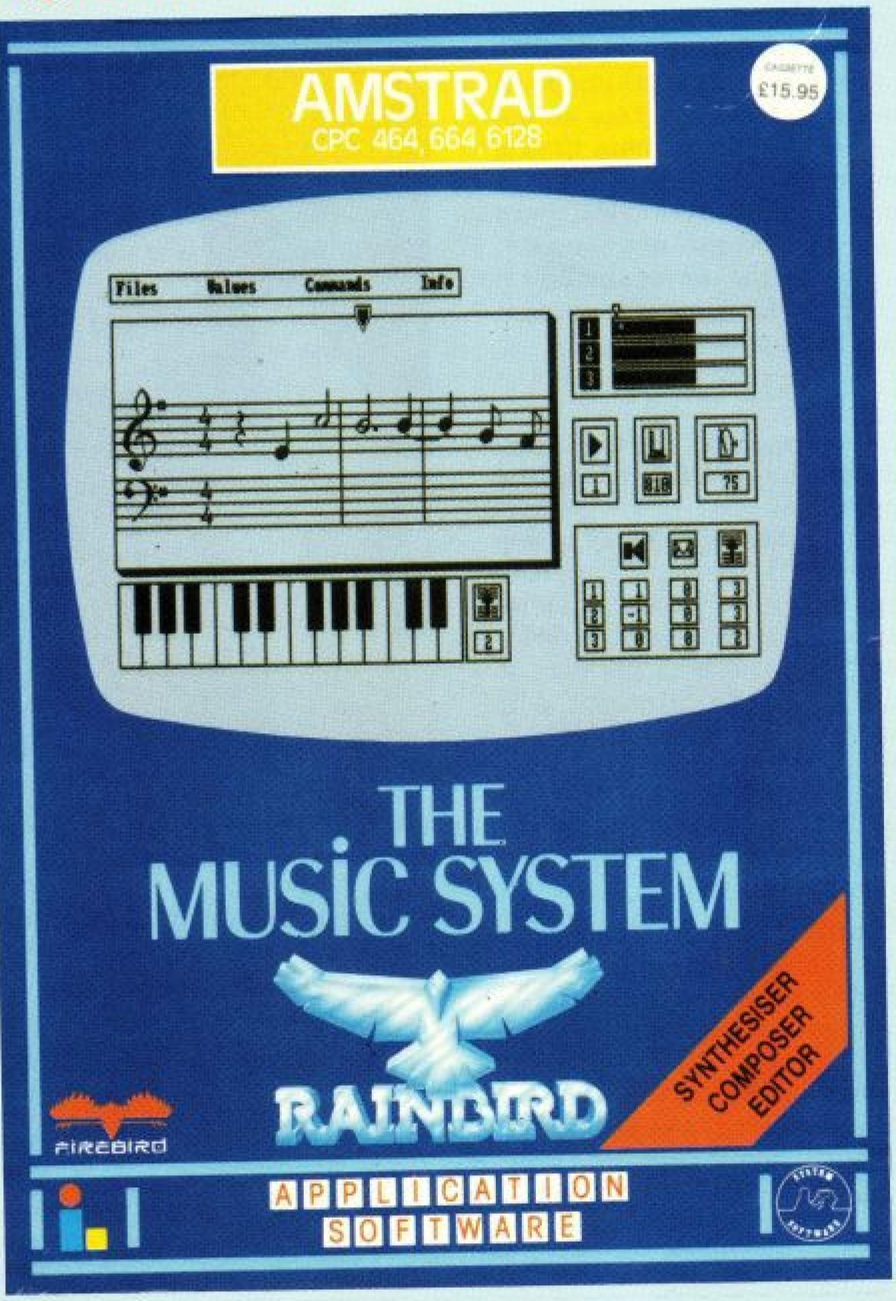
Games rely on these interrupts to let them know when to move a sprite or knock off a bit of oxygen. The sound



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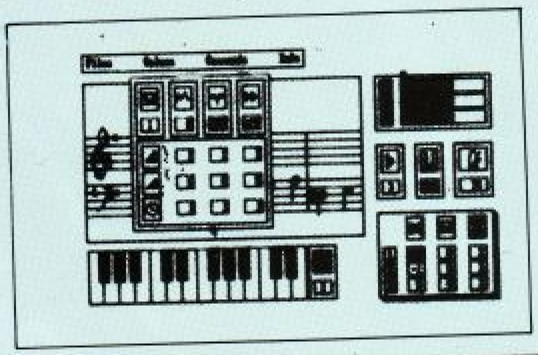


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envelopes that got mentioned earlier also get sorted out at this time, as the processor can decide whether to change the volume of any notes playing.

Keyboard conspiracy

Another important thing that happens during interrupts is the keyboard scanning. The keyboard is a matrix, a bit like those ram chips, with rows and columns.

At each intersection of row and column, there is a switch, and each key on the keyboard is one of those switches. At an interrupt the rows have a high voltage scanned along them, one at a time.

Incidentally, this is done by the unholy alliance of the 8912 and the 8255 that was mentioned earlier. The 8255 puts the volts on, the 8912 pulls them off.

When each row has a voltage put in it, the columns are read. If any of the columns register when a row is scanned, then voila! – the processor knows that the key at the intersection of the row that's got the voltage on it and the column that's being read has been pressed and can take appropriate action.

This is why pressing three keys down at once can have unexpected results – the voltages get confused and the processor makes a wrong assumption.

Sh! – I'm listening to a disc

Those fortunate souls with disc drives will have noticed that when a disc is being read or written to (and discs are another story, people), any keypresses are never noticed by the computer.

This is because disc/memory transfers happen at a great rate of knots and have to be rather carefully timed.

An interrupt going off in the middle would result in lost data and confusion all around. So the Z80 stops looking at interrupts and any keys that get pressed in the duration of the disc transfer get sent to the great bit bucket in the sky.

It's the same with tapes. The signal on a tape is quite simple – if it's high its a one, and if it's low its a zero. Well, not quite that simple, but it's close.

So when the processor is looking at a tape it has to give it it's complete attention. It can't afford to miss a bit.

However, unlike discs there is enough leeway for the processor to eak a look in now and again at the keyboard, just to check if BREAK's been pressed. This happens nowhere near as often as usual, though.

But most of the time, interrupts are on and the keyboard/joystick gets read on cue. The software takes care of keys that get pressed when a Basic program isn't ready for them by putting the keypresses in an area of memory until the program catches up, so it's difficult to out-type Arnold.

And all of this – the TV production, the keyboard handling, the carefully timed and managed data transfer, goes on all the time, from the second you switch on the machine, during games, during programming, during anything.

It's a level of engineering that makes even the smoothest of cars seem a little crude. All you have to do is provide a program that makes use of all this. You don't even have to write it yourself.

Like we said earlier, you should be honoured.

ACU

Quoite



A Basic and machine code game for Amstrad CPC computers by Andrew Stevens

Quoite is a stunningly difficult game, so much so that we nearly decided not to print it. However the high speed scrolling is so impressive that we felt that you should have a chance to use the program.

It uses the method of scrolling given in The Hairy Hackers Haunt in the December 1986 issue of *ACU*.

Some instructions are included in the program, but more detailed ones, including those needed for typing in the game, are given here.

Scenario

You play the part of a lost Quoite fighting desperately for its freedom from the forbidden caverns. To get out Quoite must collect one crystal from each level by floating over it and then leaving by floating to the exit.

But it's not as easy as it sounds (nothing ever is, is it?). The caverns are carved out of ice and are continually bouncing around in thin air.

If poor Quoite hits anything but a crystal, including the exit before he has collected a crystal, he will lose energy and once all that has gone or his time has run out his game will be over.

Entering the program

First type in Listing I, the main program, and then save it to tape. If you are using a disc-based system you will need to change the load command in line 10 from LOAD"!" to LOAD "!Coding.1".

Next type in Listing II. This creates the machine code. Once it is working you won't need Listing II again, but save it to another tape for safety's sake.

When you have Listing II complete position the tape so that it is wound just past the Quoite program (Listing I). Run Listing II, which should be in memory following the standard Amstrad saving routines which will appear on the screen. This will save the machine code after the Basic.

To run Quoite simply rewind the tape to the beginning and press Control and Enter.

Disc users should type in and save both programs. Then run Listing II. This will put the Coding.1 file on to your disc. Load and run Listing I and the game should run.

PROGRAM SUMMARY

20-25	Sets up the sound and character for Quoite.
75-98	Blanks out all the colours and then draws the screen for each level.
100-700	Main game routines, including the scrolling screen.
8000-9012	Routines for completing a level and completing a game.
10000-10070	Sets up the variable.
10090-10250	Sets up the main menu screen.
10300-10310	Checks for keys being pressed and alters variables accordingly.
10400-10440	Prints up the game's characters to show what each looks like.

To move use these keys: **Q** – Up **A** – Down **O** – Left **P** – Right

VARIABLES

x	X (across) Position for scrolling.
y	Y (up/down) Position for scrolling.
st	Start of screen coding.
h	Peek for position in memory of screen coding.
a	Character number for character to pick up.
n	Character number for exit.
en	Amount of Quoite's energy.
ti	Time for complete game.
lev	Number of levels to complete game.
l	Current level.

```
1 REM --------------------------
2 REM          QUOITE
3 REM   By Andrew Stevens 1986
4 REM --------------------------
5 REM  All rems can be obmitted
6 REM --------------------------
9 CLS
10 LOCATE 10,10:PRINT"QUOITE IS LOADING"
   :LOAD "!"
20 ENT -1,4,10,1,4,-20,1,4,10,1
21 ENV 1,15,-2,1,15,2,1
22 ENT 2,5,5,1,5,-5,1:ENV 2,15,-1,2
25 SYMBOL 255,65,99,54,28,28,54,99,65
30 GOTO 10000
75 MODE 0
76 BORDER 0:INK 0,0:PAPER 0:CLS
77 FOR F=0 TO 14:INK F,0:NEXT F:INK 15,2
   6
78 IF l=2 THEN ox=14:oy=8
80 PEN 15:LOCATE 5,25:PRINT"LEVEL :";l
85 P=49152
86 FOR F=st TO st+499
87 e=PEEK(F):IF e=32 THEN 91 ELSE G=4000
   0+((e-1)*32)
88 POKE 40203,G-INT(G/256)*256:POKE 4020
   4,INT(G/256)
89 POKE 40206,P-INT(P/256)*256:POKE 4020
   7,INT(P/256)
90 CALL 40200
91 P=P+4:NEXT F
95 INK 0,0:INK 1,2:INK 2,14:INK 3,13:INK
    4,26
96 INK 5,16:INK 6,7:INK 7,25:INK 8,6:INK
    9,15
97 INK 10,9:INK 11,18:INK 12,19:INK 13,2
   1:INK 14,22
98 FOR F=0 TO 3000:NEXT F
100 px=0:py=0:xx=ox:yy=oy
107 IF INKEY(67)<>-1 THEN py=-1
108 IF INKEY(69)<>-1 THEN py=1
109 IF INKEY(34)<>-1 THEN px=-1
110 IF INKEY(27)<>-1 THEN px=1
115 ox=ox+px:oy=oy+py
200 IF x<1 THEN xp=1
201 IF x>29 THEN xp=-1
202 IF y<0 THEN yp=1
203 IF y>22 THEN yp=-1
205 x=x+xp*2:y=y+yp
210 ox=ox+xp
220 oy=oy+yp
300 p=st+((oy-1)*20)+ox-1
```

```
310 h=PEEK(p)
315 IF h=a THEN AB=24:SOUND 1,20,100,15,
    2,2:GOTO 350
318 fg=0:IF h=n AND AB=24 THEN fg=2:GOTO
     350
320 so=0:IF h<>32 THEN oy=oy-yp-py:ox=ox
    -xp-px:so=2
350 IF ox<2 THEN ox=1
360 IF ox>19 THEN ox=20
370 IF oy<2 THEN oy=1
380 IF oy>24 THEN oy=25
400 CALL &BD19
405 z=45665+x+y*40:OUT &BC00,12:OUT &BD0
    0,INT(z/256)
410 OUT &BC00,13:OUT &BD00,z-INT(z/256)*
    256
420 CALL &BD19:LOCATE xx,yy:PRINT" ":CAL
    L &BD19:LOCATE ox,oy:PRINT CHR$(255)
430 IF fg=2 THEN GOSUB 8000
500 IF so=2 THEN SOUND 1,270,5,15,1,1,2:
    en=en-5
600 ti=ti-1:IF ti=0 OR en=0 THEN GOTO 90
    00 PRINT h
700 GOTO 100
8000 SOUND 1,100,100,15,1,1
```

```
8030 IF l=lev THEN MODE 1:INK 1,26:PEN 1
     :CLS:LOCATE 15,2:PRINT"WELL DONE -"
     :LOCATE 5,4:PRINT"YOU'VE FINISHED T
     HE";lev;"LEVEL(S)":FOR f=0 TO 2:SOU
     ND 1,100,100,15,1,1:SOUND 1,90,10,1
     5,2,2,7:NEXT f:FOR f=0 TO 4000:NEXT
      f:GOTO 10000
8046 GOSUB 8050
8047 GOTO 8061
8050 IF x>15 THEN x=x-1
8051 IF x<15 THEN x=x+1
8052 IF y<10 THEN y=y+1
8053 IF y>10 THEN y=y-1
8054 CALL &BD19
8055 z=45665+x+y*40:OUT &BC00,12:OUT &BD
     00,INT(z/256)
8056 OUT &BC00,13:OUT &BD00,z-INT(z/256)
     *256
8057 IF x=15 AND y=10 THEN GOTO 8060
8059 GOTO 8050
8060 RETURN
8061 FOR f=0 TO 1500:NEXT f
8070 st=st+500:l=l+1:en=en+50
8075 LOCATE 3,5:PRINT"CONGRATULATIONS:":
     LOCATE 6,7:PRINT"LEVEL:";l-1:LOCATE
      7,9:PRINT"COMPLETED":LOCATE 2,11:P
     RINT"ENERGY ";en
```

```
8080 FOR f=0 TO 3000:NEXT f
8090 GOTO 75
9000 GOSUB 8050
9005 LOCATE 3,2:PRINT"YOU HAVE RUN OUT":
     LOCATE 7,4:PRINT" OF ENERGY":LOCATE
      3,6:PRINT"LEVEL";l;"REACHED"
9010 FOR f=0 TO 3000:IF INKEY$="" THEN N
     EXT f
9011 IF f<>0 THEN NEXT f
9012 FOR f=0 TO 3000:NEXT f
10000 MODE 1:INK 0,0:INK 1,0:BORDER 0:IN
      K 2,0:INK 3,0:PEN 2:PAPER 1:CLS
10050 AB=0:l=1:x=15:y=11:st=40500:a=3:n=
      4:fg=0
10051 xp=1:yp=1
10060 en=100:ti=400
10070 ox=5:oy=12:lev=2
10090 b=3:h=6:GOSUB 10100:b=9:h=17:GOSUB
       10100
10091 b=20:h=23:GOSUB 10100
10099 GOTO 10200
10100 PAPER 1:LOCATE 2,b-1:PEN 3:PRINT C
      HR$(136);STRING$(36,CHR$(140)):FOR
       f=b TO h:PAPER 1:LOCATE 2,f:PEN 3
      :PRINT CHR$(138);:PAPER 0:PRINT ST
      RING$(37," "):NEXT f:LOCATE 2,h+1:
      PAPER 1:PEN 3:PRINT CHR$(130);:PAP
      ER 0:PRINT STRING$(37," ")
10101 RETURN
10200 LOCATE 4,4:PEN 2:PRINT"QUOITE '86"
10201 LOCATE 10,6:PRINT "By Andrew Steve
      ns"
10202 LOCATE 5,11:PRINT "N - Change Leve
      ls to completion":LOCATE 5,13:PRIN
      T"C -           Play Game":LOCATE
       5,15:PRINT"T -     Change Time Lim
      it"
10203 LOCATE 6,17:PRINT "Time :";ti;" "
      :LOCATE 23,17:PRINT"No. Levels :";
      lev;" "
10204 LOCATE 10,21:PRINT"Q - Up       O -
       Left":LOCATE 10,23:PRINT "A - Dow
      n     P - Right"
10240 INK 0,15:INK 1,11:BORDER 11:INK 2,
      0:INK 3,3:PEN 2
10245 LOCATE 22,4:PEN 3:PRINT "ENERGY:";
      en:PEN 2
10250 GOTO 10300
10300 a$=INKEY$:IF a$="" THEN 10250
10301 a$=UPPER$(a$)
10302 IF a$="C" THEN GOTO 10400
```

```
10303 IF a$="T" THEN LOCATE 6,17:INPUT "
      Time ";ti:IF ti<>0 AND ti<21 THEN
      GOTO 10203 ELSE ti=600:GOTO 10203
10304 IF a$="N" THEN LOCATE 23,17:INPUT
      "No. Levels ";lev:IF lev<>0 AND le
      v<3 THEN GOTO 10203 ELSE lev=2:GOT
      O 10203
10310 GOTO 10250
10400 BORDER 0:MODE 0
10417 INK 0,0:INK 1,2:INK 2,14:INK 3,13:
      INK 4,26
10418 INK 5,16:INK 6,7:INK 7,25:INK 8,6:
      INK 9,15
10419 INK 10,9:INK 11,18:INK 12,19:INK 1
      3,21:INK 14,22
10420 POKE 40203,64:POKE 40204,156:POKE
      40206,72:POKE 40207,193:CALL 40200
10421 POKE 40203,96:POKE 40204,156:POKE
      40206,152:POKE 40207,193:CALL 4020
      0
10422 POKE 40203,128:POKE 40204,156:POKE
       40206,56:POKE 40207,194:CALL 4020
      0
10423 POKE 40203,160:POKE 40204,156:POKE
       40206,216:POKE 40207,194:CALL 402
      00
10424 POKE 40203,192:POKE 40204,156:POKE
       40206,120:POKE 40207,195:CALL 402
      00
10425 POKE 40203,224:POKE 40204,156:POKE
       40206,200:POKE 40207,195:CALL 402
      00
10426 PEN 4:LOCATE 5,6:PEN 4:PRINT"A STO
      NE":LOCATE 5,8:PRINT "A CRYSTAL":L
      OCATE 5,10:PRINT"THE EXIT":LOCATE
      5,12:PRINT"A BALL":LOCATE 3,1:PRIN
      T"OBJECTS IN THE GAME-"
10427 LOCATE 3,15:PRINT CHR$(255);" YOUR
       CREATURE"
10429 LOCATE 4,19:PRINT"PRESS ANY KEY"
10430 PEN 3:PRINT:PRINT:PRINT " COLLECT
       A CRYSTAL  AND THEN GO FOR THE
         EXIT"
10431 IF INKEY$="" THEN 10431
10440 GOTO 75
```

```
1 REM      - Machine Code Enterer -
5 CLS:LOCATE 15,10:PRINT"PLEASE WAIT"
10 MEMORY 39999
11 RESTORE 100
12 sum=0:FOR f=40200 TO 40236:READ z:sum
   =sum+z:POKE f,z
13 NEXT F
14 IF sum<>1523 THEN PRINT"ERROR IN 100-
   105.":END
100 DATA &06,&08,&21,00,00,&11,00,00
101 DATA &7E,&12,&23,&13,&7E,&12,&23
102 DATA &13,&7E,&12,&23,&13,&7E,&12
103 DATA &23,&1B,&1B,&1B,&14,&14,&14
104 DATA &14,&14,&14,&14,&14,&10,&E4
105 DATA 201
200 REM        -SCREEN ONE-
210 FOR F=40500 TO 41500:POKE F,0
211 NEXT F
215 FOR F=40500 TO 40519:POKE F,1:POKE F
    +20,2:NEXT F
220 FOR F=40540 TO 40959 STEP 40:POKE F,
    1:POKE F+19,1:POKE F+20,2:POKE F+39,
    2:NEXT F
225 FOR F=40960 TO 40979:POKE F,1:POKE F
    +20,2:NEXT F
230 POKE 40722,4:POKE 40723,4:POKE 40742
    ,4:POKE 40743,4
231 POKE 40630,3:POKE 40631,3:POKE 40650
    ,3:POKE 40651,3
240 REM        -SCREEN TWO-
241 sum=0:RESTORE 300:FOR F=41000 TO 414
    99:READ z:sum=sum+z:POKE F,z:NEXT F
242 IF sum<>463 THEN PRINT"ERROR IN 300-
    305.":END
300 DATA 1,1,1,1,5,5,5,5,1,0,0,0,4,5,6,5
```

MicroLink in association with TELECOM GOLD

NEWSLETTER

Every home a ticket office ?

FREELANCE journalist and MicroLink subscriber Roger de Freitas travels a lot during the course of his work.

So naturally he finds MicroLink services such as the Official Airlines Guide to flights and hotels, and the British Rail booking facility a great help.

"I use my micro as a word processor and MicroLink to send and receive information", he said, "but I use the system a lot for planning my travelling arrangements.

"And even when I'm not actually going on a trip I enjoy just scrolling through the flight schedules and train timetables.

"It occurred to me that it would be rather nice if one could obtain the ticket at the same time as booking a train journey.

"The present MicroLink system of booking with British Rail is very good, but I still have to queue for 20 minutes at Waterloo Station to pick up my tickets.

"I look forward to the day when BR and MicroLink will allow me to print out my own ticket from the system so that I don't have to stand in line any more.

"I'm sure I'm not the only MicroLink subscriber who would appreciate such a facility, and with the way technology advances these days we will hopefully see it happen in the not too distant future".

Library logs on

IAN McGowan has five million books in his library, and the total is increasing by about 70,000 volumes a year.

He's thankful he doesn't have to dust them, but he does have to keep track of them — which is where MicroLink comes in.

As a Keeper of the National Library of Scotland, Ian is one of seven people charged with managing the contents of the 300-year-old institution.

With the library dispersed among five different locations, this is no mean feat. But Ian intends that MicroLink's telex and electronic mail will soon allow the various buildings to communicate with each other swiftly and efficiently.

At present there is a sophisticated telex set-up in the main building, but it is not linked to the other sites so a messenger has to go between them with pieces of paper. Eventually, however, there will be a MicroLink mailbox at each location.

Emergency hot lines

MICROLINK has joined the emergency planning team for Shropshire, providing the county's civil protection group with additional communications options for use in crisis situations.

County emergency planning officer Gordon Tipler explained: "Communication is vital in a disaster, and the general rule is the more alternative means you have at your disposal the better. MicroLink will give us extra options through electronic mail and telex.

"In addition its databases will prove very useful — for instance Save a Life as a training aid for our emergency service volunteers and other technical material for our team of scientific advisers".

Bridging culture gap

HARLEY Street dentist Dr Hesham El-Essawy feels strongly that Moslems get a raw deal from the British media, and consequently are misunderstood by the general public.

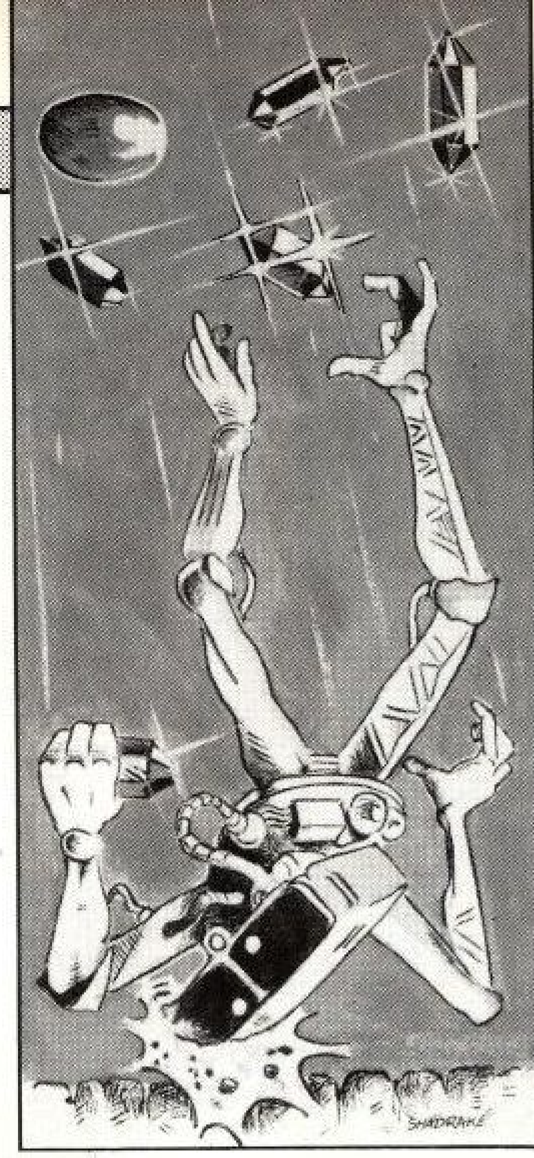
"I put it down to ignorance of the Islamic world", he says. "If we could overcome this through educating people we would be on the way to achieving tolerance and understanding".

Dr El-Essawy is chairman of the Islamic Society, an organisation set up to promote religious tolerance in the UK. It has 300 active members spread throughout the country, and also a large number of associate members – mostly Christians – who are aiding the cause.

"We are using MicroLink telex, electronic mail and telemessages to maintain a flow of information about Islam to the media and various other organisations", he said.

"A large number of our associate members are schoolteachers, and it is important to get our message over to the schools. Thankfully most British schools are on-line so we can reach them through MicroLink".

```
    64,132,12,8,64,12
435 DATA 14Ø,Ø,64,76,14Ø,8,64,12,152,8,Ø
    ,132,152,8,Ø,132
44Ø DATA 152,12,Ø,132,152,12,64,132,48,8
    ,64,12,48,8,64,12,96,8,64,12,192,128
    ,Ø
445 DATA 12,64,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,8Ø,16
    Ø,Ø,Ø,24Ø,6Ø,Ø,8Ø,18Ø,124,16Ø,8Ø,6Ø
45Ø DATA 252,24Ø,8Ø,124,248,16Ø,Ø,6Ø,24Ø
    ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,3,3,Ø,1,86,252,
    168
455 DATA 1,252,195,168,1,233,195,168,1,2
    52,169,2,Ø,1,2,Ø,Ø,Ø,Ø,Ø,Ø,21,42
46Ø DATA Ø,Ø,63,243,Ø,Ø,123,243,Ø,21,123
    ,243,34,21,243
465 DATA 179,34,21,243,51,138,123,179,1Ø
    3,2Ø7,123,179,1Ø3,143
47Ø DATA 123,179,1Ø3,143,63,179,1Ø3,143,
    21,179,51,1Ø,21,243,51
475 DATA 34,21,123,51,34,Ø,243,179,Ø,Ø,2
    43,243,Ø,Ø,81,162,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,
    Ø
5ØØ REM It's saving time
5Ø1 SAVE "CODING.1",B,4ØØØØ,2ØØØ
5Ø2 SAVE "GRAPHICS.BAS"
9ØØØ END
    ,6,6,5,1,2,2,2,2,Ø,Ø,Ø,Ø,2,Ø,3,Ø,4,4
    ,4,Ø,Ø,Ø,Ø,2,1,1,1,1,Ø,Ø,Ø,Ø,2,Ø,3,Ø
    ,4,4,4,Ø,Ø,Ø,Ø,1
3Ø1 DATA 2,2,2,2,Ø,Ø,Ø,Ø,2,1,2,1,2,1,2,Ø
    ,Ø,Ø,Ø,2,1,Ø,1,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,1,2,Ø,2,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,2,1,Ø,1,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,5
3Ø2 DATA 2,Ø,2,1,1,1,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
```



```
    ,Ø,Ø,Ø,6,5,Ø,Ø,2,2,2,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,1,6,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,2,5,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,5,6,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,6
3Ø3 DATA 1,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,1,2,1,2,1,Ø,Ø,Ø,5,1,1,Ø,Ø,Ø,Ø,Ø,Ø
    ,1,2,1,2,1,2,5,2,Ø,3,Ø,6,2,2,Ø,Ø,Ø,Ø
    ,Ø,Ø,2,1,2,1,2,1,6,1,Ø,3,Ø,1,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,1,2,1,2,1,2,1,2,Ø,3,Ø,2,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,Ø,2,Ø,2,1,1,1
3Ø4 DATA 2,1,Ø,Ø,Ø,5,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,1,Ø
    ,Ø,2,2,2,5,2,Ø,Ø,Ø,6,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,2,Ø,Ø,Ø,Ø,1,6,1,1,2,1,1,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,2,1,2,2,1,2,2,Ø,Ø,Ø,Ø
    ,Ø,1,Ø,Ø,Ø,Ø,3,3,Ø,1
3Ø5 DATA 2,1,Ø,2,Ø,Ø,Ø,Ø,Ø,Ø,Ø,2,2,Ø,Ø,Ø
    ,Ø,3,Ø,2,1,2,Ø,Ø,Ø,3,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,1,2,1,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,1,1
    ,1,2,1,2,1,2,2,2,5,5,5,5,6,6,5,6,5,6
    ,2,2,2,1,2,1,2,1,1,1
4ØØ FOR F=4Ø5ØØ TO 41499:IF PEEK(F)=Ø TH
    EN POKE F,32
4Ø1 NEXT F
415 REM     -  GRAPHICS DATA -
42Ø RESTORE 43Ø:sum=Ø:FOR f=4ØØØØ TO 4Ø1
    99:READ z:sum=sum+z:POKE f,z:NEXT f
421 IF sum<>14525 THEN PRINT"ERROR IN 43
    Ø-475.":END
43Ø DATA Ø,Ø,Ø,Ø,Ø,128,4,8,64,192,192,8,
```

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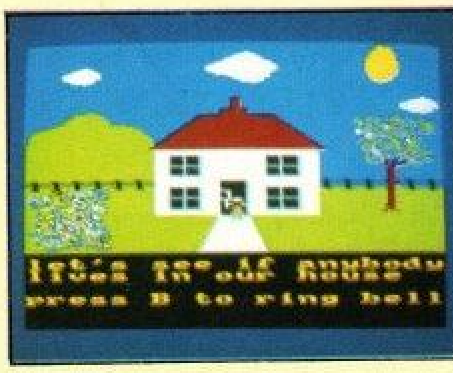
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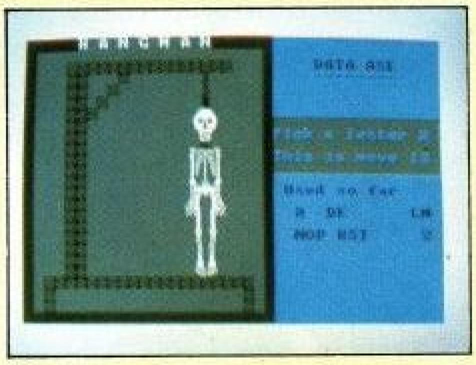
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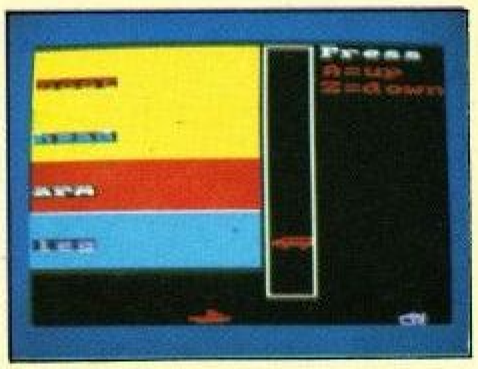
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Amstrad's going into orbit

Amstrad's part in the British Satellite Broadcasting (BSB) consortium has been widely publicised. Following BSB's successful acquisition of the IBA franchise, it has been generally assumed that Amstrad's role in the scheme will be to produce cheap dish receivers for the new service.

However, a new and hitherto secret plan has been uncovered involving Amstrad at a high level.

The BSB group's original plan was to launch Eurosat V – the orbital transmitter – in 1990 by the Space Shuttle. But due to the Challenger disaster the Americans are now several years behind schedule and not accepting any bookings.

Similarly, BSB's fallback launcher, Europe's Ariane rocket, has been suffering major technical failures and will not be ready until 1992.

The Russians and Chinese, although they have reliable launch vehicles for hire, are understood to be politically unacceptable.

About a year ago this problem was foreseen and a contingency scheme made to get a satellite into space even if all other means were unusable. Six months ago it was decided to take this route but it is only now that details have started to leak out.

In great secrecy, Alan Sugar has gathered together a team of Britain's top space scientists and, it is believed, is to attempt a British-based launch to get BSB's satellite – or bird – into orbit on time.

Details have been hard to come by, but it seems that there have been secret trips to America and Korea to garner parts and experience.

From the States Amstrad scientists have bought several Gull boosters from NASA's abortive Credo Venus mission. In conjunction with America's premier rocket institute, Livermore-Farnell Orbital Operations Laboratory, these have been adapted to use a revolutionary new propellant.

This propellant is thought to be the reason Amstrad can feasibly hope to launch a rocket themselves.

Developed at UCL, it is still shrouded in secrecy but informed sources claim that it involves micro-pulverised sucrose, hydrogen peroxide catalyst and a stream of superheated oxygen to achieve mass-to-thrust ratios previously unheard of.

Somewhat appropriately, the fuel has been nicknamed Alanox and the modified engines dubbed the Alanox Peroxide Rapid Injection Launchers.

The mission will be in three stages. First, all three boosters will fire, with two at full thrust and one at 40 per cent.

When the two run out and are jettisoned (for later recovery), the final booster will step up power and achieve low-earth orbit. The payload bay will then activate and take the satellite into geosynchronous orbit some 22500 miles above Brentwood.



Photograph A: G-force testing equipment

Alanox

The Alanox reaction is nothing new. It has been tried at JPL, where its suitability as a means of propulsion for terrestrial craft was tested. The results were described as: "Unpredictable, negative and noisy".

The reaction itself is a fairly straightforward redox reaction between the micro-pulverised sucrose and the liquid oxygen (hydrogen peroxide was added by the Amstrad research and development team, only being there to prevent an excessive build-up of slag in the exhaust nozzles).

The reaction proceeds as follows:

$$C6H12O6 + 6O2 = 6H20$$
$$\triangle \text{ H-ve } 2720KJ/mol$$

This is obviously a very exothermic reaction, producing a large amount of hot gas for a relatively small amount of fuel.

Because of this the rocket's exhaust nozzles are not only cooled

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Figure II: Satellite & Footprint

Some experts express concern that Sugar has chosen to employ a new nozzle compression valve, mean ventura size three inches, instead of the standard five and a quarter inch fitting.

They are also worried about the heat dissipation figures. Amstrad engineers are not perturbed, and have a unique centrifugal-effect vaned coolant unit ready should it be needed.

The main rocket consists of three APRILs, with a payload bay designed and built by Amstrad's highly qualified engineering division, the famed Fifth Floor.

The design has been the first application for the in-house networked transputer system which has been under development for some time now.

The same hardware was responsible for the flight simulation and orbital planning using the Linked Orbital Calculation On Simulated Craft Reentry Involving Proposed Timing package, again written by Amstrad staff.

Mission electronics have come from the Amstrad factories in Korea. This has helped keep the all-important cost down to below the £400 mark for the complete computer navigation, control and guidance system.

It is believed that, should the project be a success, Amstrad will be retailing complete home orbital vehicle packs for

by the usual circulation of oxygen, but also by the vaned coolant unit.

Rumours that the casing may melt are without foundation, as the main source of heat is outside the casing itself.

There are small areas in which heat does build, notably near the base of the rockets. These are swathed in a blue paper-like substance which is removed by the first flames. The areas of heat build-up are circular and form pink spots.

During trials, tests marked with a radioactive tracer at Amstrad's own laboratories produced large quantities of a slightly radioactive caramelized slag, which had to be disposed of.

Eventually this was foamed with an inert gas to reduce the density, encased in a dark brown boron doped resin and protective aluminium foil, to be dumped in their secret warehouse known as 'Round tree'.

This gained a small amount of publicity as the Amstrad Effervescent Remnants Operation.

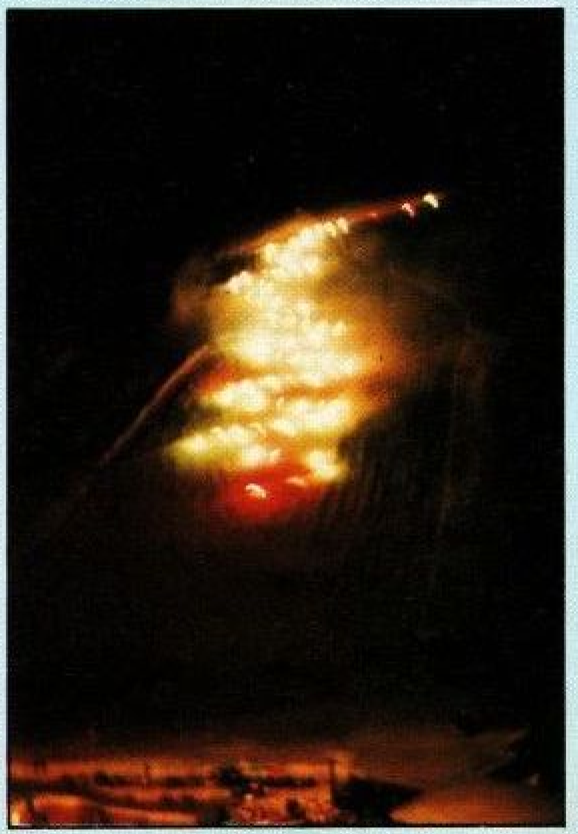
A great deal of work has gone into producing refined Alanox.

Early work was done using culture dishes until a microbiological organisim had been engineered, capable of taking a variety of salts and turning them into the necessary organic parts for the manufacture of Alanox.

Much of the Alanox research took place in Brentwood, accounting for the loss of several small buildings. Once things started to get really dangerous the Alanox development was moved to Austria.

Full details are not available but it is understood that this is where the accident in photograph B took place.

A road tanker carrying Alanox collided with a car on a mountain road. This caused the tanker to spring a leak and pour Alanox down the mountain.



Photograph B: Alanox accident

somewhere in the region of £600. If it is unsuccessful, the price will come down somewhat and the rocket be renamed the Sinclair C7.

The flight control's exact location is unknown, but it is probably not near Brentwood.

However, a picture of control during a mission simulation has been obtained, and the location of Dixons in Tottenham Court Road has come up in connection with the mission.

Experts have confided that the launch will be risky. The decision, therefore, to lift-off from the centre of Basildon will cause some controversy. Especially if the rumour that the entire Amstrad staff will be moved to a large bunker somewhere in Dartmoor turns out to be true.

The European group which have built and will operate Eurosat V are not going to allow their investment on to such an untried vehicle. Amstrad has developed its own broadcast satellite, again using the skills of in-house designers and the constructional prowess of the Far East.

Specifications have been seen, and the satellite will have two tape decks, a remote control and a CD player. It is not known whether it will support an EGA.



Figure III: AF00 Launcher

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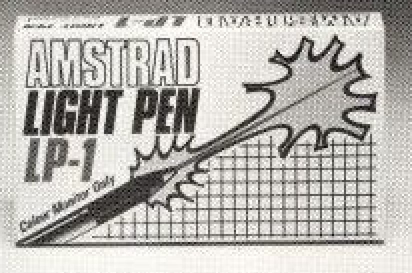


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Seek and ye shall find..

Into adventures with Bill Brock

Delta 4's latest to hit the streets is distributed by Piranha and follows – very loosely – Terry Pratchett's novel, The Colour of Magic. Throughout the adventure you direct and control a somewhat inexperienced young wizard, Rincewind by name and unpredictable by nature.

This poor chap had an unfortunate experience during his sorcerous training. He so thoroughly learnt one of the wizard's eight vital spells that it lodged permanently in his brain.

This so completely fouled up his learning processes that he was unable to complete his matriculation in wizardry. Fortunately his natural talents as a translator are unimpaired and he seems to be able to earn a meagre living.

Having been accepted for training as a wizard, he cannot die unless Death himself is present at the occasion. This gives him a slight edge over any mere mortal around and his life seems at times just a little charmed. After all, even Death cannot be everywhere at once.

Rincewind lives in a city called Ankh Morpork, on Discworld. This is a strange world: Not only is it flat and disc shaped but travels through space on the back of a giant tortoise, which in turn is supported by four enormous elephants.

For more information on the amazing theories surrounding Discworld, you will either have to buy the book by Terry Pratchett or read the instructions with the game. If you have the slightest leanings towards fantasy I would thoroughly recommend you do both.

The adventure starts with the impoverished Rincewind sitting in front of a small beer in the one and only public room of that well know hostelry, The Broken Drum (you can't beat it!). Who should be escorted in by Blind Hugh but Discworld's first tourist – Twoflower.

Four-eyes Twoflower appears to be as rich as they come but is having problems making himself understood on this strange world. Neither is Hugh Blind exactly the best guide for a man wanting to see everything . . .

Rincewind smartly offers his services and is



Really crazy goings on . . .

promptly given the post of translator and guide to the aforementioned Twoflower. Having organised a good nights rest for his benefactor Rincewind is all set for a tour of the local high-spots.

Unfortunately, on this side of the river Ankh Morpork is not quite as civilised and law-abiding as the local tourist board might wish.

Rincewind and Twoflower have quite an exciting time, ending up with Twoflower being abducted. Following Rincewind's heroic attempt at a rescue, the town on this side of the river gets burnt to the ground.

Escaping on horseback, the two gallop into a further series of adventures, with the grim reaper just itching to cash in Rincewind's chips at the slightest opportunity.

Adventures now follow in rapid succession with attacks from such as trolls, wild bears, wolves, demonic entities, dragons and pirates.

Discworld's own pantheon of Gods seems to take a keen sporting interest in the pair's progress and Death himself is never far away.

In fact Death would now appear to be quite desperate to correct the situation of having special living

conditions granted to one so unimportant as Rincewind.

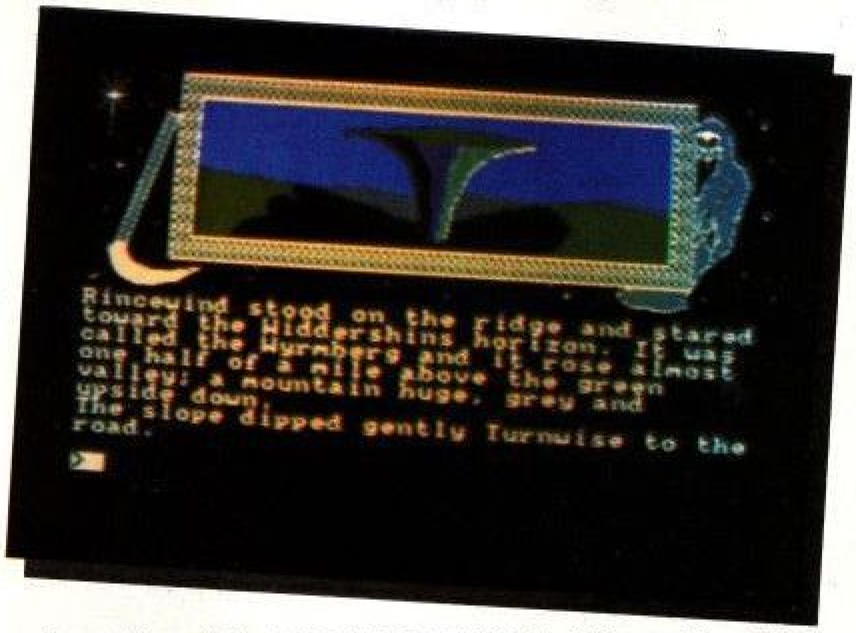
Throughout all this, Twoflower takes everything in his stride, showing the naive "everything will be alright in the end" attitude that is the hallmark of a dedicated tourist.

The Colour of Magic comes on cassette for the CPC machines and is a large program, to be played in four consecutive parts. At the conclusion of each part the game must be saved (to disc or tape) and then loaded at the beginning of the next episode.

A number of key locations are graphically illustrated but the game's main aim is to give plenty of good readable text. A minor action will often produce volumes of amusing and relevant information to keep up the flow of the main storyline.

Commands may be given in short sentences but are analysed as simple verb/noun inputs, so EXAMINE THE ROCK FRAGMENTS may be more quickly and easily typed in as EXAMINE FRAGMENTS or even EXAMINE FRAG.

You may – indeed you must – interact with the main characters of the story by talking to them. This



is achieved by TALK TO XXXX, followed by SAY XXXX XX XXXX.

The most notable exception to this comes very near the beginning where Rincewind first becomes aware of Twoflower.

Trying to TALK to anyone to offer your services as a translator does not have any effect – the direct input LET ME TRANSLATE or TRANSLATE does the trick and you are on your way.

The first part takes place in the town of Ankh Morpork and you will need to plot this carefully. There are less than 40 locations but due to the twisty nature of the streets in the old town, care is needed to get an accurate map.

As all the action takes place on Discworld, the normal directions of North, South, East and West are not applicable. In their place you must use Hubward, Rimward, Turwise and Widdershines (or H, R, T and W).

I have assumed Hubward to be equivalent to our more common use of North and as Widdershines is an archaic term for anti-clockwise, I have used this as west.

It really does not matter which you choose. Locations on your maps will still be in the same relation to one another, though they may just be mirror images of other peoples' maps.

Once you set out with Twoflower events will happen at breakneck speed. So it may be wise to become familiar with your city either before you offer to assist him or before the first day's excursions.

When things start to hot up you have a useful ally in his alien luggage. This is a many footed sentient box, very loyal to its master and if at all possible it will follow him wherever he goes.

Having explored the town and recorded some of its more colourful features on Twoflower's rather special camera, you will eventually find that safety demands you leave in a hurry.

The second and later parts take you outside the town. Although you still have freedom of movement, this is very limited and you must solve a series of puzzles to proceed to further locations.

The Colour of Magic has a RAM SAVE/LOAD facility – use this and the regular save option often, Death is waiting for your slightest error.

At some point you will probably interact with a creature called K!SDRA: The program will not permit the use of the exclamation mark, so ignore it and use the form KSDRA.

Altogether a fascinating adventure, well written and full of excitement and humour. The format of sharply defined problems to solve makes it a good challenge for any adventurers, novice or expert.

The puzzles may sometimes seem insoluble but don't give up – there is an answer there for you to find.

Some cereal

Adventure games these days often seem to be based on an existing book or film. We now have one that relies for its appeal on a radio serial – The Archers *(I'd count Hitch Hikers as the first – Ed)*.

Written for Mosaic by Level 9 it certainly has good references but whether it could be strictly classed as an adventure game I'm not so sure. It follows the same pattern as their very successful (commercially at least) interpretation of Adrian Mole.

A well-written text storyline together with some fairly simplistic graphics is followed by the choice of three options to further the plot.

As I have never knowingly listened to the Archers, I found the finer points of the story a little difficult to grasp. It also seemed that although I gave definite commands – like sacking someone – these were not always carried out.

Now keen followers of the radio version would probably realize that this "just should not be done", but as a newcomer to all these country village politics I found it undermined my belief in the story. Did I have control or not?

Probably not. You play a trainee scriptwriter and the aim of the game is to please the listeners and boost audience figures. Failure to do so gets you some nasty memos from the controller of Radio 4.

I presume someone in higher authority countermanded my instructions in an effort to reduce the losses I was causing the BBC.

The Archers is cassette based for any Amstrad

CPC and consists of four parts. In each part take the plot decisions for a different character: Jack Woolley, Eddie Grundy, Elizabeth Archer and Nelson Gabriel. To get to the next part you must increase the audience by a million listeners.

If you are not familiar with the people involved in



The Archers the instructions include a very comprehensive potted history of all the characters.

This alone would make the program worth buying if you are thinking of taking up a regular post by your radio at 7.05 pm (or 1.40pm) in the future.

For all my earlier criticisms, the plot decisions are reasonably logical, if a little bizarre to the outsider. If you are, or have ever been an Archers fan, this is certainly a game for you.

With a little previous knowledge I'm sure I could have raised the program's ratings to that of the nine o'clock news.

Lost and found

Last month we had some useful hints for Fantasia Diamond from G V White of Middlesex. This month he has a few hints for one of his favourite adventures – The Saga of Erik the Viking.

This was written by Level 9 and distributed by Mosaic. It has often been recommended and should in my opinion be on every adventurer's shelf.

Eric's family has been kidnapped and the adventure concerns his travels to rescue them – it will keep you on the edge of your seat for many, many hours.

The following are only hints and by no means a solution – but they are pretty specific in places. Do not read on if you would rather solve the puzzles for yourself.

Apart from 11 islands to visit there are many hostile islands and an iceberg. Since icebergs tend to float around a bit it is quite hard to pin down its position, but it can be found somewhere near the Deep Fjord.

A maelstrom makes an appearance during your travels and will sink you unless you have the plug. To stop the maelstrom, Throw Plug – though this action does tend to reposition you. A nuisance but better than being dead.

When the iceberg is sighted, Melt Icicles with Rushes: Get the Rushes and Light Rushes with the Kindling and Whetstone. Wear the Skates and get the Plug from within.

This should be one of your first ports of call – sail around to sight the iceberg and land via the Iceberg Ledge.

You will meet a Dragon at some stage. To free it from its misery you must climb up to its nose and get the feather. Back on deck you will find a whistle. Blow whistle and the Dragon will come and rescue you – but only once.

Quite often you will see a dolphin and at one point you will need to approach him to get Fish Breath. When you see the dolphin, leave your boat – the Golden Dragon – carrying the flask. Fill the flask and then use the command In to get back on board. Examine the flask to confirm your catch.

Your sails are liable to wear and tear, and you must have the right tools to mend them. For this you will need the Needle, then when you get the message that your sails are in need of repair: Get Needle and Mend Sails.

It is possible to get to the various islands without sailing from point to point. If you examine the pot, Blueblade, Medallion, Monument and Tombstone, you will see various maps.

To arrive at these destinations you need to start from the deck of the Golden Dragon and rub the object which has the relevant map, then open the rag bag.

This will blow the ship to that location shown at the centre of the map. The Medallion shows your current position.

When ashore, to return to the Golden Dragon, Rub



Amulet (providing you are wearing it) and this second teleport system will transport you back to the deck of the boat.

Finally, examine everything. There are lots of things for Erik to find that will help him (and you) on this voyage of rescue.

At last

Anybody reading a computer magazine in recent months, must have been aware of the stir caused by an adventure game called The Pawn.

It first appeared for the Atari ST and has since

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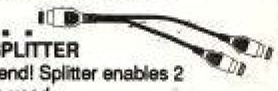
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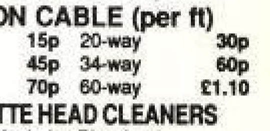
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been converted for several machines. A few months ago the first Amstrad version appeared for the PCW 8256. Soon after we had the pleasure of playing The Pawn for the Amstrad CPC 6128.

The Pawn is interesting for two reasons. Firstly, it was produced by Magnetic Scrolls, a new name in the adventure field. Secondly, it showed a high degree of technical competence.

Many good adventure games have been written using adventure creation programs. Not so The Pawn. It shows what clever and original programming can achieve – given the funds, dedication and support of a major software house.

Most experienced adventurers tend to keep their inputs down to the bare minimum verb/noun combination for two reasons. Firstly, because early games could only accept such inputs and secondly, because this format makes for the least typing and quickest method of keeping up the rapid flow of the game.

The programmers of The Pawn set out to create an operating system that should allow the rawest of newcomers to enter whatever command comes into their heads.

Anita Sinclair of Magnetic Scrolls said she wanted a game her mother could play. Obviously the inputs have to have some relevance to the situation, but having accepted that minor limitation almost anything goes.

Although such sentences as DROP ALL EXCEPT THE VIOLIN CASE THEN KILL THE MAN EATING SHREW WITH THE CONTENTS OF THE VIOLIN CASE are quite possible, few players would wish to get involved with such tortuous phrases. More to the point is the general freedom of action and "speech" given to the player.

The first version (Atari ST) also had a selection of excellent graphics. The 6128 cannot produce such hi-resolution pictures. Even so, those it has, are equal to any adventure game on this machine. They are drawn quickly and fill most of the screen.

The cursor control keys will scroll the pictures up or down allowing space for the copious amounts of text that gives the game it's true character.

The story behind The Pawn is described in a glossy 55 page booklet. Although there are very few clues to the game, it makes entertaining reading and sets the stage for the adventure.

There is a blend about the game which mixes modern parody with classic fantasy. A missing princess, an evil sorcerer and fantastic castles mingle with a nuclear device, sunglasses and royal photographers. All are mentioned but whether or not any of this is of any significance must be left to the player to discover.

You start knowing nothing, having been transported to the edge of a great forest in Keronvia. You must talk to those you meet and solve a variety of puzzles to expand your knowledge of both Kerovnia and your quest. Draw your maps carefully and read the text thoroughly.

You must also exercise your powers of observation – not everything is immediately obvious at each location. There are a number of editing commands which make life easier for poor typists. A simple spelling mistake can even call back that input for re-editing.

There are several hints which can be accessed by typing in the relevant code for that problem. This can be laborious as some of them are quite long. Some clues are more funny than helpful *(try listening to the Wall – Ed)*. This can be a little frustrating. Several groups of code are given for each problem – persevere, almost certainly one will be useful.

The Pawn should remain a classic of its type, not cheap, but worth having. Rainbird are making a name for only distributing good quality software and this is no exception. Magnetic Scrolls are now working on several new adventures Let's hope that Amstrad users do not have to wait too long for The Guild of Thieves, Mag Rolls next epic.

Star Wars

How many stars do you give this that or the other adventure game? Giving percentages for different facets of its performance is one way, but, at the end of the day one has got to judge how well it *plays*.

Not how it looks or sounds, nor whether it has the greatest parser ever seen or many thousands of words in its vocabulary. These aspects can make a good game better but none can make a poor game good.

There would seem to be 10 major areas on which any game may be judged: Text, Graphics, Sound, Vocabulary, Parser, Addiction, Playability, Interaction, Level (novice/expert) and Originality.

Listing these for each game would probably take up too much of our valuable space, and would it really tell us how a game plays?

Looking at other magazines shows that they too have eventually come to the same conclusion and have gradually changed their systems to give a more subjective but meaningful assessment.

Considering the attributes above but in various combinations, gives what I hope will be a clearer picture: In future, adventures will be rated out of a possible hundred points to show: Plot, Atmosphere, Addiction, Difficulty and Overall. So here's the first set of ratings:

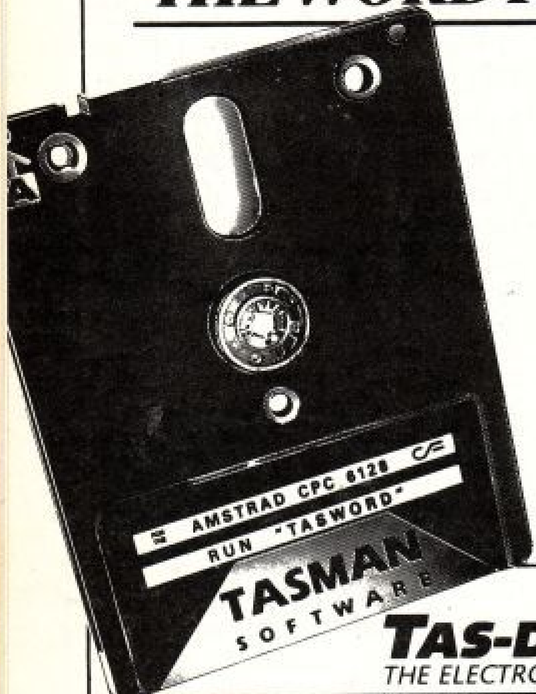
	Colour of Magic	The Archers	Erik the Viking	The Pawn
Plot	85	55	80	75
Atmosphere	80	45	75	80
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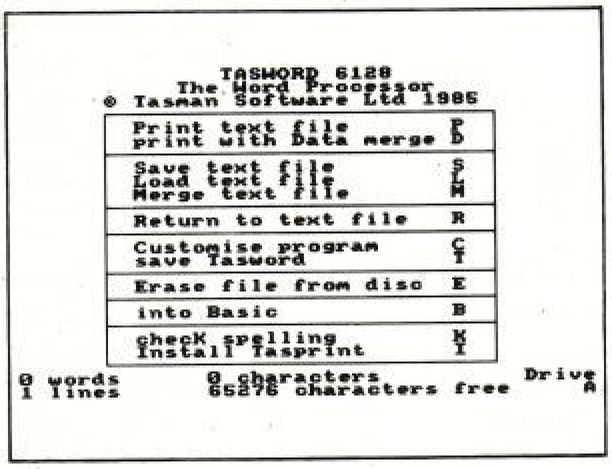
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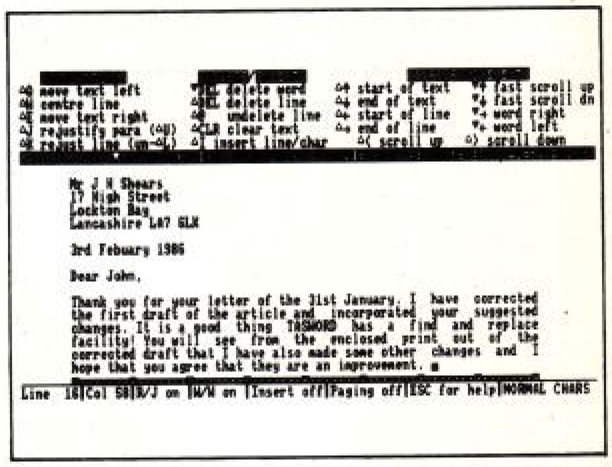
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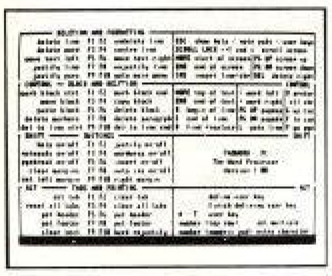
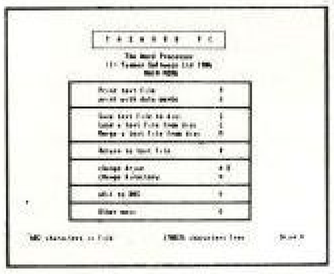
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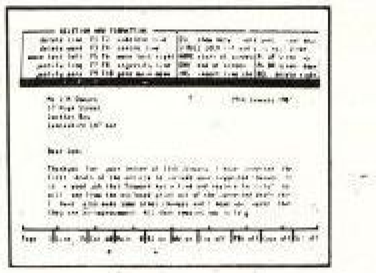
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SOFTWARE REVIEWS

AGENT ORANGE



Great idea for a title, a cancer-causing weedkiller dropped in Vietnam. Could have been a bit more subtle, but most other weedkiller names are trademarks of someone or other. Why weedkiller? Does this game have something against the Ed ? Nah, it's a semi-strategy game for space-faring farmers:

Ahrr well, see, thur almost be a strategy to it. You have this gurt big Mother Ship, an' a whole flock of weeny Daughter Ships that goes flittin' roun' the univerze ('bout eight planets) planting yur zeed and harvestin' yur crop in. The Mother Ship stays put an' yur Daughter Ships goes round loik little tractors.

They enemy wants most to put a cozmic twelve bore behind yur rear, an' only thing to do be to shoot back at they with yur own. Don't seem to run out of cartridges fur the shooter, neither.

Them furriners be growin' a ztrange sort of crop too. Funny stuffs, b'aint even fit fur zilage-makin'. Plenty o' weedkiller, that's the answer. All yer got to do is grow eight planets full o' zeed. Meanwhile, if yur flies yur ship low, an' fires yur shooter, that ouht to keep the weeds down a bit.

Harvestin' in these tractors is easy as steppin' in a cow pat. All yur do is file over the ripe crops, an' it's all hoovered up inzide. Mustn't overdo it, 'cos if yur do, yur tractor falls out of the sky, bein zumwhat overloaded.

When thur's enough crop to sell, ye can trade with zity types on yur home planet fur better ships an' bigger twelve bores.

Anyways, after eight of they planets, yer end up with a real good fast ship, an' get the chance to rip off some o' that new-fangled weedkiller loike what the other gaffers use. Tha'll make ye very pop'lar with the rest o' the univerze, and yur EEC subzidy moight even go up.

Author: A n' F
Price: £9.95

Nigel

Whenever I get a game for review I try to think whether I'd buy it. This is a game I'd never have taken off the shelf. Why? Because A n' F haven't produced a good game since Chuckie Egg and the packaging is dull.

If this had been the case I would have missed out on a great game. Challenging, absorbing and fun. If Argus, who own A n' F can do some work on packaging and razzamataz then this will sell and sell.

14/20

Liz

The programmers seem to have hedged their bets with this one, a bit of scrolly shot-em-up, a bit of trading and some strategy. That's what made Elite a success and should do the same for this.

Now I'm not saying that this is the next Elite but it does allow you to get into the part. The Mode 1 graphics are pretty good, and the ship control fast enough. Overall a surprisingly good game.

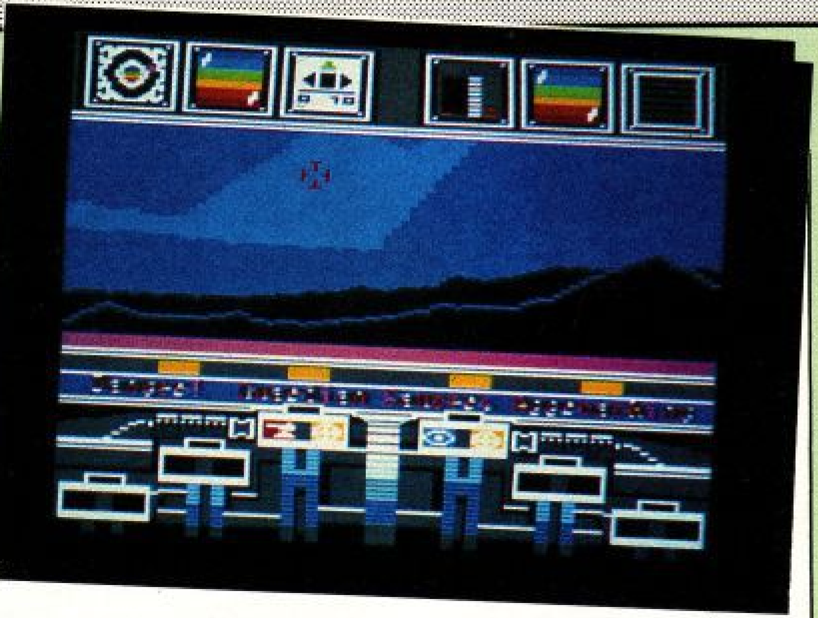
12/20

Colin

Just what I can do with; a shoot 'em up game, with a bit of strategy. Nothing too straining on the ol' grey matter, but enough to get me to load it up more than once.

The graphics were a bit plain, but clear. Much in the same way as Highway Encounter was. The amazing thing about this game is that it uses the Game of Life, previously thought only to be of interests to philosophical hacks, but used here as a way of growing the crops.

16/20



KORONIS RIFT

A lot to get through on this one my lovelies, so pay attention. Open your books at page 34. Science-Fiction Plots, Alien Civilizations (Advanced, Ancient, Departed). Sub-Plot 32 – The Fabled Treasures Of A Long-Gone Mega Race Lie Before The Fortunate Prospector.

The goodies in this case lie on the Magrathean planet of Koronis, a radioactive globe scored by rifts.

In these rifts, your sensor systems report, lie a number of abandoned war machines, each holding arcane weapon systems which any disreputable hi-tech metalnabber would give his/her/its leftmost protuberance for. And you've found them first.

All lucky ol' you has to do is pootle down to the long-abandoned landscape below, get your repo-tech (RT) robot to scurry across the radioactive wastes and return with a hold just bursting with machines, any one of which would make you a Big Noise among Big Noises. Sounds too easy? Of course it is.

The creators of your putative mealtickets saw fit to defend them against all comers with a fleet of flying saucers. No doubt you're not exactly what they were designed to dismantle, but you'll do. So as you hover hardwarewards, these computerised Defenders of the Bits will do their automated utmost to stop you.

You have a few things on your side. Little things that mean a lot, like the chromospecific lasers, the shields and your RH robot. The radar that shows you where to go for the hulks holding the goodies. The onboard computers. They all go to make life worth living (well, possible).

So you plummet through the atmosphere and home in on a convenient wreck. Out pops RH, who returns smartly with an Interesting Bit.

By some strange machination of fate, the modules that you find can be fitted to your ship and can add to your firepower and defensive capabilities no end. Obviously the InterGalactic Standards Bureau has had more luck with spacecraft than anyone's having with RS232.

You can also analyse these mislaid modules for worth, power and other attributes. If you choose to dismantle them, their intrinsic worth gets credited to your bank balance. However, they might be worth more in your ultimate endeavour.

There are 20 rifts. In Rift 20, on Farringdon Road, (? – Ed) lies the Guardian Base, which controls and maintains the saucers which cause you so much aggro.

As befits such an installation, it is very heavily defended. If you want any chance of destroying it, you've got to collect a lot of very powerful weapons fast and do it to them before they do it to you.

Fight and flight take place in your fractally active main window. Above this sit a set of monitors, displaying vital info concerning your ship. Below the window sit icons showing the systems you have and which ones are active.

You've got to keep an eye on all of them – for example, your shields have varying efficiency against various lasers. Colour is the key.

Destroying the Guardian Base is very lucrative. So is a series of lightning raids on the planet; you choose your method of personal enrichment and the best of Betelgeusian to you too.

Author: Lucasfilm/Activision
Price: £9.99 tape, £14.99 disc

Nigel

One of the things I liked about Agent Orange (reviewed elsewhere) was that the instructions were divided into two parts. Waffle and the bits you need to play.

Koronis Rift is the opposite, you must read the boring bits of blurb and sort out the useful bits before playing. When you've made that investment you can launch into worlds unknown.

There is a good role-playing sensation which makes Koronis an absorbing blast.

18/20

Liz

Activision loses money, a very great deal of money. When it produces games that are as good as this it must take very great skill to do so badly. Perhaps gamesters are so tied up in the last Activision game they bought that they don't get down to the shops for the next one.

Koronis takes a lot of getting into. In a way it's Fractalus with knobs on. The quick start instructions help but a friend who understands what is going on is better.

17/20

Colin

Koronis Rift follows Rescue on Fractalus in the Lucasfilm jaggedybits series. In similar style, you pilot a scout through a forbidding landscape – a bit too similar, really.

Lovely spot graphics though, I was especially taken with the starting sequence. The controls are fiddly and a bit difficult to understand, but there are a number of hidden depths to the game which lie in wait for the determined gamester who shrugs off the first impression of a graphically-good but gamesplay-stunted bit o' software.

Greenscreeners need not apply, as colour is vital to the cause. More subtle than it looks.

17/20

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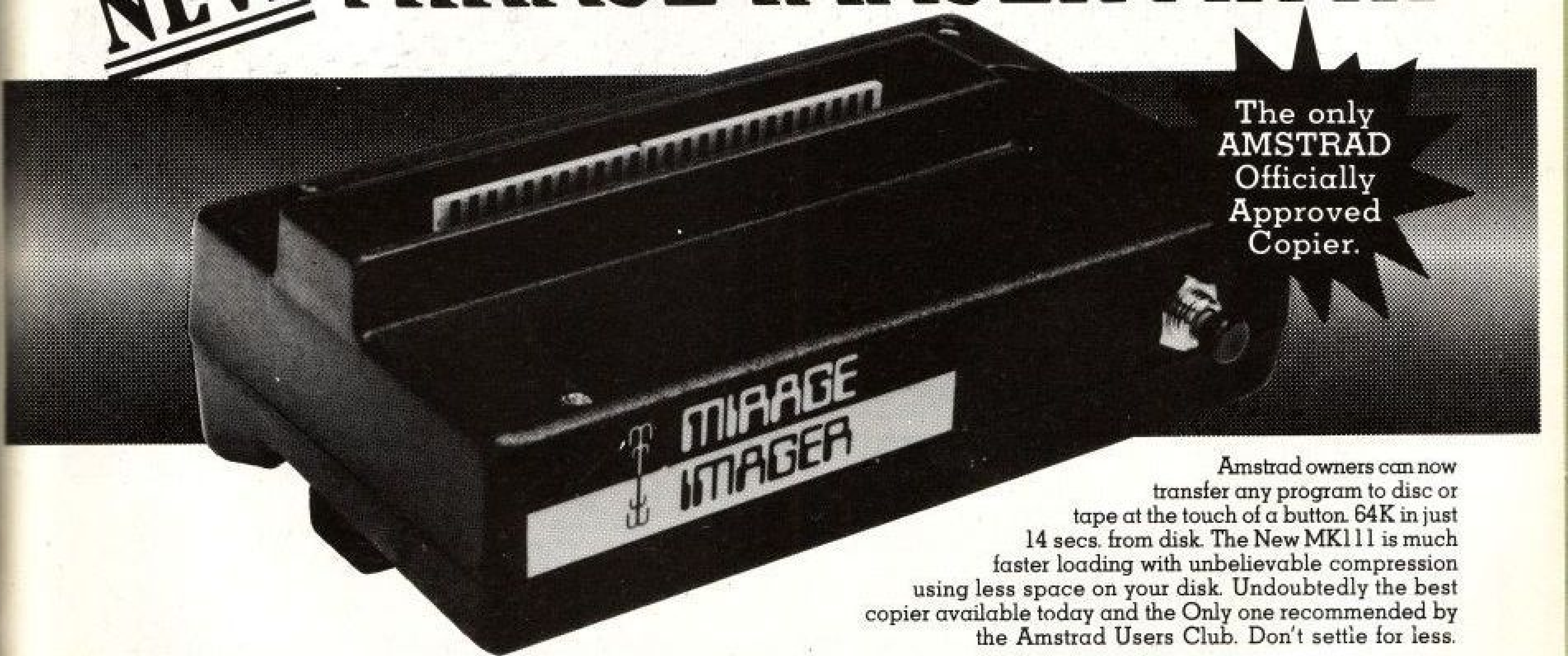
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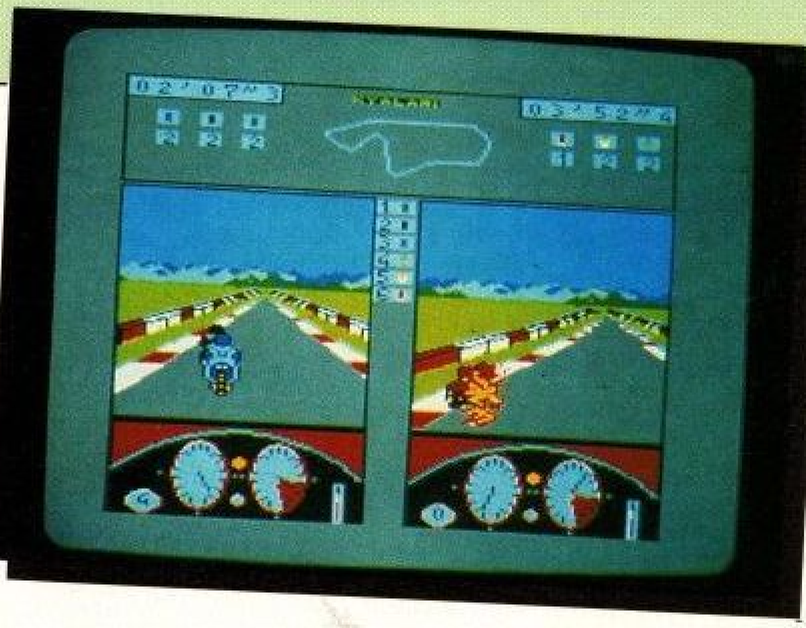
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Now whatever Mel Smith and Gryff Rys-Jones may say about the French, there is no denying the fact that previous French offerings for the Arnold have been pretty reasonable – so is this another Froggy tour de force?

Once loaded, a really spectacular (a few lines in the middle of an otherwise blank screen) display appears. With all the pzazz of a wet kipper, you are given the choice of three levels. There are the obvious beginner and pro options but I would be intrigued to know why the middle level is pilot – I thought it was a bike, not flight, simulator.

Next you get to pick either a red or a blue bike – there is no advantage for either one – you just pick the colour to fit your mood (or politics) I suppose.

Finally you get to choose either joystick or keyboard control. Discerning games players will know that there isn't really much choice (unless your parents were members of the mollusc family with eight tentacles.)

The major selling point of this game is not so much its use by single players but its two player option. Assuming you have a joystick cable splitter or a JY2 type of joystick that allows another to be plugged into it two can play simultaneously using joystick. Otherwise it's all huddle round the keyboard time.

Once you have picked whether you want to take part in all 12 international grand prix(es) ? or just one, and have chosen whether it's going to be two laps of practice or a full nine lap race, the screen changes to multicoloured Mode 0.

The screen has two main windows. One for each bike. If you are playing on your own one window will effectively be redundant, though the action will continue to happen in the "unused" screen as well as the one you use.

The windows are identical, each showing the particular bike as if viewed from about 10ft behind it. The motion of the other bikes is shown relative to this, so as they accelerate faster you see them moving away ahead.

The feeling of motion is given by the two age old techniques of flashing red and white road edging (the epileptic's nightmare) and the same clump of nondescript mountains scrolling from side to side in the distance.

Beneath each "view" are the bike instruments. The large dial on the left would appear to be the speedo, while that on the right is the tacho – actually more useful cos you know to change up when the arrow goes into the red.

Between the windows is a column of "coloured lights" which are kept sorted into order as the positions in the race change – a nice touch.

At the top of the screen are six coloured squares that give a lap count for each bike. A lap time is also given for each bike. In the middle there is a small version of the circuit you are currently racing. It took a while to realise that the red blob on this actually marks the start/finish line. It's a shame coloured dots on this map couldn't have been used to show relative positions.

Author: Microiods/Activision
Price: Tape £9.99 Disc £14.99

Nigel

Mode 0 graphics and poor controls always count against a game. This game started low in my opinion and fell when I discovered that boring Silverstone had been chosen for the British race as opposed to the less accurate but interesting Brands.

Cornering seems to be a matter of getting the speed right, the gears are fiddly and you cannot slide. A mediocre program.

6/20

Liz

'Tis a strange thing that there is a host of car racing games for other machines and the CPC has relatively few, yet a few years back when I wanted a bike game no one had produced such a thing.

Now there are loads all on our fave machine. This may have been spurred by Sega's Hang-On in the arcades. I am as useless at this as I am in the arcades and found the whole thing boring.

8/20

Colin

The idea of this game is quite good, especially if you can find a friend to ride the other bike.

Unfortunately the control leaves a lot to be desired and I found the best technique was to keep the fire button pressed almost all the time and slam the joystick from right to left (or left to right) as a corner approached.

When racing against the other bikes I invariably came last (even on beginner level) because once you have crashed it is virtually impossible to catch up with the others. I think I'll stick to the real thing until something a bit more realistic comes along.

10/20



IMPOSSABALL

There is a devil allocated to games' reviewers who takes a diabolical delight in fulfilling their heartfelt wishes. When faced with the tenth shoot-em-up in three months, yours truly uttered a prayer for something different. Novel, even. It's not easy finding a snappy line for the same thing 10 times.

Well, my wish was granted. Impossaball happened. The devilish thing about it is that it's a little difficult to describe.

You've no doubt seen Marble Madness and others of that ilk where rotund devices (balls) roll about a surreal landscape, avoiding trouble and placing great demands on the ballistic skills and joysticular dexterity of the player. Impossaball isn't that.

You might even have seen the variants where the ball bounces instead of rolls, and hidden planes mask the worst excesses of the programmer's imagination. Well, Impossaball isn't that either.

It's a bit of a mixture of the two, but with a lot of originality too.

The game opens on a checkerboard top and bottom with a helping of parallax, and the Bouncing Ball amidships. To the right are a pair of ladder-like objects. These are the starting gates.

Joystick control is simple enough – push the stick forward and the ball moves away from you along the checkerboard. Pull the stick back, and the ball comes back towards you. Left, and the ball moves left. Vice versa for right. Pressing fire makes the ball bounce higher.

Guiding the ball past the starting gate gets the fun underway. At the bottom of the screen are three numbers. The first is the number of cylinders left – we'll come back to that in a minute. The second is the score, which increases as you move to the right. The last is the time in seconds left to go.

From the roof and floor of the alleyway grow a variety of things. The first to look for are the cylinders. The idea behind the game is to bash these with your ball (psychologists into symbolism won't be detained for more than a few seconds by this) until they retract into the surface.

To make them do this, you must bounce the ball off their ends. There are so many cylinders per floor: to reach the end of a floor and claim any bonus that might await you have to clear the lot.

Trouble is the spiky things. These grow from the floor and roof too, but have this nasty habit of puncturing yer ball. At first. they are just a bit of a bother, making you bounce a bit higher or a bit later. A bit farther down the floor they become a serious hazard as they cluster about the cylinders.

Then they get really nasty. After the first six cylinders, you will no doubt have picked up the technique of positioning the ball beneath a cylinder and bouncing up.

This is not terribly useful when there's a spiky thing just where you want to bounce, so you have to catch the end of your chosen column on the fly.

And just when that seems a little less than impossible, along come the Wandering Spiky Things (the computer journalist's vocabulary is truly remarkable). And these wreak real havoc.

Just remember the old maxim. "If you can't think of three hundred different combinations of spikes and cylinders, you haven't played Impossaball".

Author: Hewson
Price: £8.95 tape, £14.95 disc

Nigel

Some games make me perk up. Some make me yawn. This one made me yawn. But then I had been playing it at three ayem . . .

There's something about this particular combination of simplistic, surreal graphics and gradually increasing complexity of play that I'm an absolute sucker for. Definitely the pick of the month for me.

To be played with high volume Tangerine Dream via headphones. Yum!

19/20

Liz

We often argue at ACU, usually about how good a game is or isn't and who is going to wash the cups. We rarely argue about who is going to keep a game after it is reviewed. Impossaball is an exception. We all wanted it.

How does Hewson do it? It must be the best software house around. True, much of the brilliance only shows on the Crumbodore 64, but with John Phillips on the CPC they are showing true colours. The best game yet for 1987.

20/20

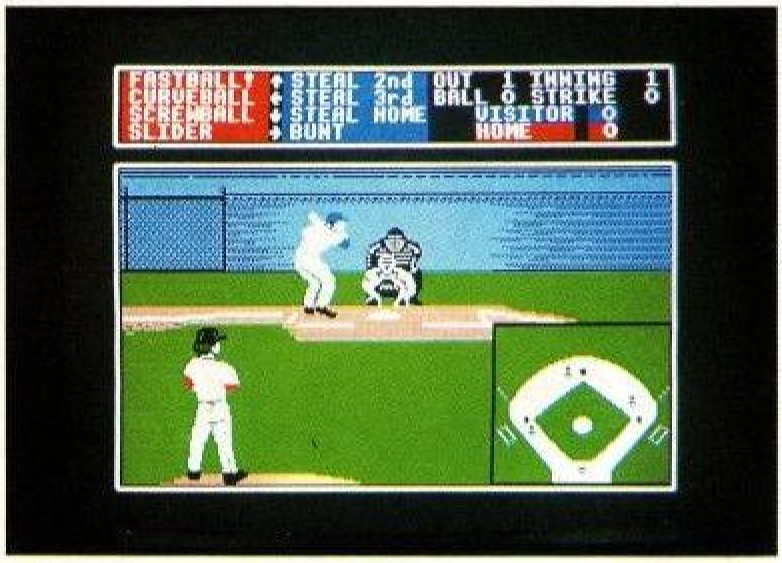
Colin

Parallax scrolls have always impressed me so with Impossaball it was love at first sight. The control you have over the ball is excellent and the shadow helps you know where you are.

If I really want to find fault then the colours are a bit bland and the ball could've been shaded but that is nit-picking. Perhaps I'm just miffed because Liz got to keep the tape.

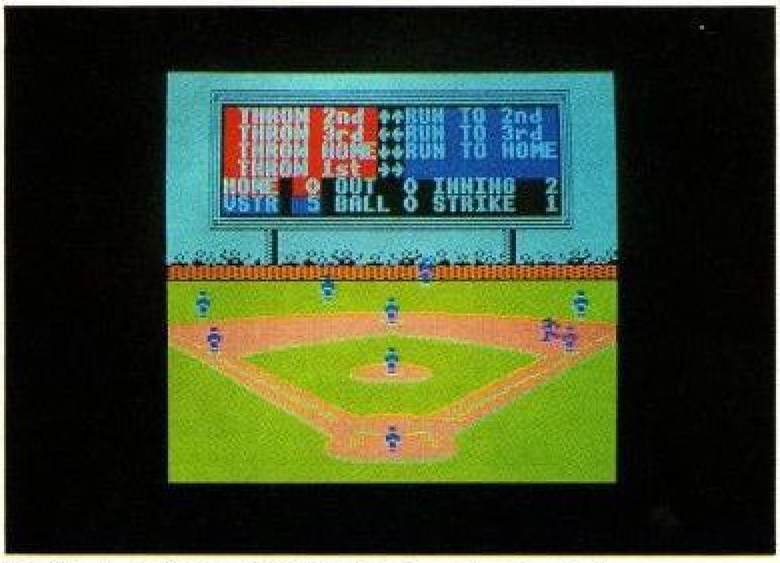
19/20

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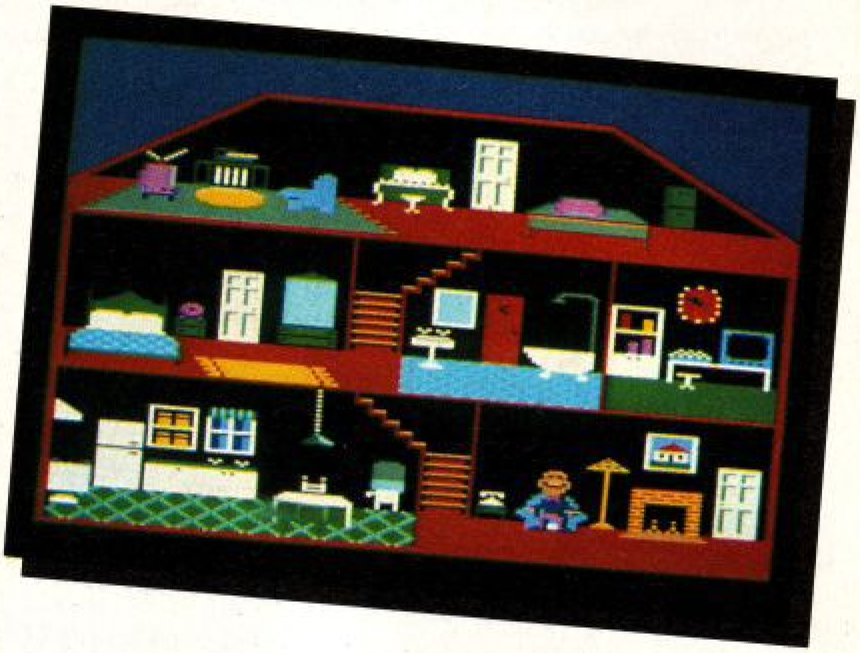
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ACU/4

LITTLE COMPUTER PEOPLE



Computer programmers and the like have long known that their toys, while supposedly being inanimate and obedient, have now and again shown streaks of mischief and sheer perversity. Something has to explain those mysterious bugs which creep into a man's deftly structured code.

The secret is out. There are little people in your Arnold. Activision has conducted intensive research into this phenomenon and now presents for your edification the Little Computer People Discovery Kit.

Running the program for the first time produces a cross-section of a house (not dissimilar to a doll's house with the front hinged off).

Tastefully decorated in Mode 0, the three floors comprise kitchen/living room, study/bathroom/bedroom and TV room/music room/workroom. All mod. cons. as standard, its purpose is to tempt your own LCP out of hiding into the open.

And, after a few minutes, your very own LCP arrives. He (and it always seems to be a he) gives the house a thorough going over, before dashing out to grab his effects. With, it must be said, his dog.

Once he's in residence, it's up to you to keep him fed, well and happy.

Interaction with your LCP (mine is called Alex ... perhaps it should be LACP) is through the keyboard. If you type in stuff as usual, it gets sent as a message to your Person.

Control and a letter perform certain functions. Topping up the water supply is Control+W, leaving dog food is Control+D, that sort of thing. You can also give the LCP a little TLC, by means of the Control+P function. The Americans call this petting, another example of the linguistic divide, methinks.

Pressing Control+P summons the LCP to his easychair, pressing it again makes a hand appear from one of the walls and pat him on the head. This sort of thing is necessary from time to time, because even if you keep your LCP topped up with the bare necessities he'll pine for a little human companionship.

You can leave him a record or book at the front door, and this usually cheers him up a bit. So does responding to his request to play a game: He's a dab hand at poker and an advanced form of Snap (called Card Wars).

To find out his feelings, you can ask him to type you a letter. He won't always want to, but he is quite happy to pour out his feelings when he does. He's also partial to a phone call.

Things go seriously wrong if you omit to feed him for a few hours, or let the water supply get low. Too long without either and your LCP gets sick and takes to bed.

And yes, he really goes green (or if you're watching this in monochrome, greener). This is bad, and an intensive course of food, drink and petting is needed to revive the old spirits. Well, it always works for me ...

And when the antics get a little wearing, or work calls, you can always remove the disk, put your LCP to bed and wake him up later. If only real life was like this.

Author: Activision
Price: £9.99 tape, £14.99 disc

Nigel

Is it absurd? Is it a game? No, it's Little Computer People! I've seen no stranger sight than four grown men, hardened hackers all, cooing and gurgling over LCP running on an Amstrad. The undoubted charm of this, er, package is hard to explain, a bit like owning a pet but without the messy bits. But charm is certainly the strong point.

The process of upkeep tends to pall after a few hours, but it's a good one to run for a bit if you're feeling jaded. And I've never managed to starve the lad yet, I always cave in at the first sign.

16/20

Liz

My parents once went to the pet department at Harrods. They asked for a dog which was well behaved, didn't make a mess, didn't cost a fortune in vet's bills and feeding and could be left alone in the house. The kennelmaid suggested they try the toy department.

If LCP had been around then she'd have sent them to the computer section. All the fun of owning a pet, none of the fuss.

17/20

Colin

LCP cannot be reviewed on a normal gameplay basis.

OK I can comment on the graphics – they are too chunky and should have been in Mode 1. Instead they look like the Commodore 64 the game started on. Even in mode 0 it is possible to do better.

LCP can be reviewed on an emotional basis. I like our LCP, and I think he likes me.

17/20

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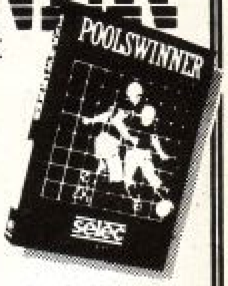
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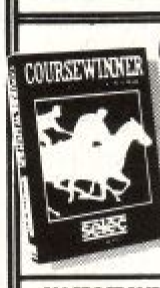
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FLYSPY

Once upon a time, there lived a professor.

Evil, warped and epitomising nastiness, he spent his days devising plans for the general debasement of mankind and you in particular. (I'm précising a bit here. For the full and bloodspattered details you'll have to see the blurb).

After a particularly beancurdling incident he decides to plug a recently-invented supercomputer into the National Grid and ruin everyone's day by making their microcomputers seize in mid-bitbash.

This couldn't be allowed to happen, of course. Think what it would do to the Amstrad share price, after all . . . So a brave, intrepid, fearless and above all really stupid hero is called for.

If I were you I'd be a touch insulted, but you being you decide to bravely step forward and lay down your life for your National Grid.

You are issued with a helicopter, fitted with a 0.5 Whitte (oh, very good) computer and a few standard fixtures and fittings. Lasers, shields and all that jazz, if you must have it listed for the umpteenth time. And into the bowels of the supercomputer you helichop.

The fun starts immediately. Oodles of laser emplacements encrust the evil prof's pet. There are also teleporters, which save you fuel, speed your journey and enable you to have a free zap at the ENCTS which have taken an instant dislike to you and your craft.

The ENCTS – Extremely Nasty Crawly Things – are a slight and unserious cover for a quick bout of bloodletting, just in case you got bored with the rest of the game.

The supercomputer's structure is mazey in extremis. There are the traditional things lying about, you have to get them, decide what to do with them and then find a way of doing it, all with no help from the game itself (or indeed the processes of logic).

Most of the game is free from the more rigorous application of reason or reasonableness, by the way . . .

The ultimate objective, the disabling of the monster mainframe, is accomplished with the help of an N-bomb that is hidden somewhere. Other things can be used to help, or can be transmuted into fuel or batteries for the laser.

You can always transmute an object that you'll need in the game, but don't expect to finish as there's no way to detransmute.

Controls throughout the game are joystick to move the helicopter and user-definable keys (you can redefine at any point in the game) to use, pick up, drop or otherwise mangle the objects. There are also options to pause, check your time or top yourself.

This last option might well recommend itself to you in case you feel your sanity is ebbing away faster than your shield. There are occasions where you can get trapped for good anyway, and these present a more legitimate use for the suicide button.

If you're particularly foolhardy you can speed things up by going into fast mode (shades of ZX81s), but don't expect to live too long.

If all the above seems a little disjointed, complicated and confusing, then you haven't seen FlySpy yet . . .

Author: Mastertronic
Price: £1.99

Nigel

What did I do to deserve this? This game is manic! After perusing the instructions I thought I was confused. I was wrong. After playing the game I knew I was confused. After half an hour I was dazed.

It's fast, colourful, messy and £1.99 worth of experience to be tried, especially after a frustratingly slow 3D game. The author, one Richard Aplin, is destined for great things. I can feel it in my water.

18/20

Liz

You can tell this is a budget game because they didn't want to fork out for a bigger inlay card. The text is so small I tried photocopying it larger, a magnifying glass and in the end resorted to squinting.

The graphics are brilliant. Smooth sprites, shading which gives a good metallic effect and a lot going on. It is strange. I either think this is an amazing game and underpriced or it is just another spritey game with good graphics but I can't decide.

Still, it's cheap. Buy it and decide for yourself.

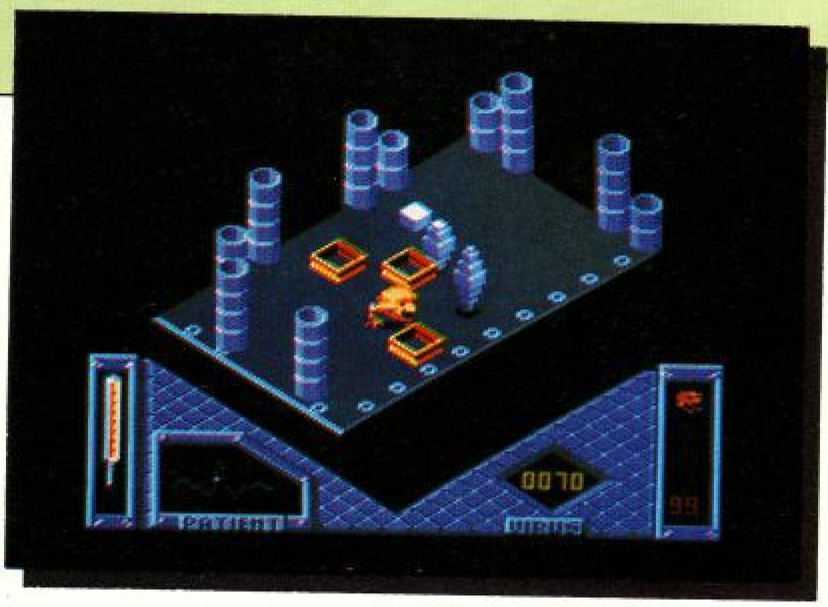
19/20

Colin

Humm, odd. When you buy Flyspy you certainly get your moneysworth. The idea of tying points to fuel ensures that even if you do nuke the computer you will still want to play again and save the fuel to bump up your score.

Different objects weigh different amounts (a feature promised for Thrust II) which adds to the skill of flying your helicopter. A great budget game.

18/20



BACTRON

SF people out there might remember a short story by Norman Spinrad called Carcinoma Angels, in which one Harvey Wintergreen (aided and abetted by a 99 per cent illicit cocktail of chemicals) went inside his own body to do battle with a terminal cancer. Nice trick if you can do it, and Bactron is here to show you how.

Bactron is a small yellow bipedal blob that has been wandering about your body since you first shuffled on to this mortal coil.

A sort of chemical – I think – it has to activate all the healing enzymes that lie scattered in the deepest ab/ recesses of your corporal essence.

Out to get him are a pretty sordid array of microscopic mobsters. Names like Mac the macrophage, Steffie the staphylococcus, Dot and Spek should tip you the wink that the guiding about of wee Bactron is going to be no pharmacological picnic.

Being well versed in the ways of computer games and the rules that pervade them all, you might expect your lowly Bactron to have a little bit in the way of zap to protect itself.

Funnily enough, it doesn't. The only weapon – apart from its legs to flee with – that the thing has is its breath which stops some of the bacterial baddies in their tracks. (mine's a bit like that first thing in the morning).

But one puff knocks a little off its energy and brushes with the marauding microbes do the jouleometer no good at all.

Your body the battlefield is depicted in a fairly standard isometric (pseudo3D) format, but with striking use of colour.

The aforementioned baddies are distinguishable, but there's no key to match the names to the faces. If they had faces, of course, which they don't.

The nastiest kind are a cross between a floating green spider and a skull. These move rapidly and are unaffected by Bactron's icy breath. They tend to travel in pairs and are to be avoided at all costs.

Then there's the bouncing blobs. Luckily enough, these seem to be completely unaware of your presence and wander about fairly aimlessly.

They're still a bit nasty to get on the wrong side of, but a little joystick juggling can be relied upon to get Bactron out on the way.

The collapsing spirals are a little nastier, as these home in. Bactron's blast does freeze them to the spot for a bit though, so they can be outwitted.

Likewise, the cavorting squares-on-sticks (oh for some proper names) tend to have a purposeful aim in their movements but can be stopped temporarily if need be.

Bactron can also push and pull various blocks and towers about the place, but usually in vein. They can be used to trap an evil entity, or reveal hidden doorways between rooms (rooms? But that's what they look like).

During this life or death battle, the patient's health is shown by a thermometer reading and a heart rate monitor. The thermo blows up quite spectacularly if Bactron fails, but there's a nice bit of boogie to sooth the stiff.

And by the way, Harvey Wintergreen beat the cancer. Trouble is, he can't figure out how to get back out of his body . . .

Author: Activision/Loriciels
Price: £9.99 tape, £14.99 disc

Nigel

Isometric games tend to have strange joystick controls. With this one you have to rotate the stick through 90 degrees clockwise (so UP is right) before things make sense.

They also tend to be difficult. This one's darn near impossible.

And they tend to need to be mapped. This one does, but you start off from a random position each time, so getting a map started can be tricky.

They also tend to be dull graphically. This one is very pretty indeed, with the best use of Mode 0 that I've seen. Nice animation, too. But nobody said it would be easy.

16/20

Liz

Bog standard Iso 3D job. Grab the 'stick and wander about a bit. Presentation – superb. Bactron is a cute, ugly bug.

The scenario doesn't quite fit the action but then it must be hard trying to think up another reason for what used to be known as an Ultimate-style game.

Buy this for the graphics alone, there is plenty to do and it's a good mindbender. Boy can the French draw.

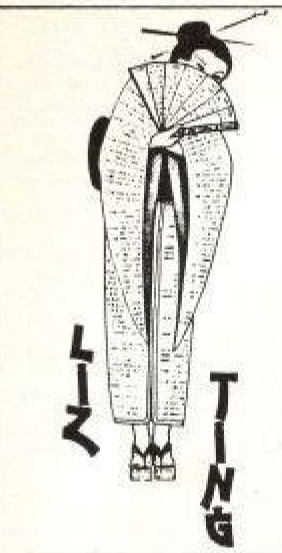
17/20

Colin

Bactron was produced in France by Loriciels and is sold here by Activision. Now Activision software usually comes with more instructions than the average Japanese home barbecue and as often as not they are just as easy to understand.

Bactron offers you two paragraphs of hype and no help. I gave up and let the germs run riot.

12/20



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10th FRAME

When the Ed said "bowls", I thought he'd spotted another spelling misytake in the mag. A regular enough occurrence, you may think. Then he handed me one of those big cassette cases that looks large enough for The Beatles Collection, but only contains one tape.

Load game, answer silly questions, and my little character (male, right-handed) teleports himself into the centre alley. Must be a private showing, 'cos all the other lanes are empty. He is holding his bowling ball, which looks much like a shaved coconut, and smoothly glides back and forth without moving his feet. In defiance of the laws of physics, he has white shadows on his black trousers.

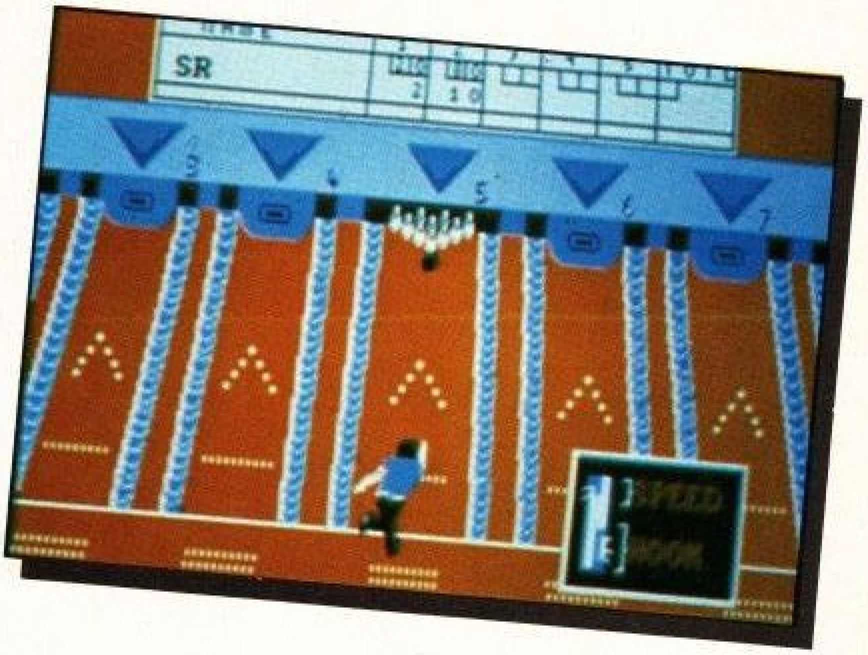
His X-ray eyes cast forth a cross, which is where the coconut will be thrown to. Pressing the button on my faithful 'stick makes a speedo line shoot up in a black box (which blocks lanes six and seven, probably why this bowling alley is so unpopular).

Letting go of the button stops it, only to start a line marked "hook" streak downwards. Press button once more, and it stops. Coconut streaks on to the hole at the end of the alley, and the bloke strikes a funny pose on one leg.

If you can figure out what the heck any of that has to do with the way you chuck a bowling ball, you're a better man than I am Gunga Din.

To me, the main appeal of bowling is the bar, which this program lacks. Shame really, 'cos you spend a lot of time waiting for cute little graphic effects to stack 10 bowling pins, looking like a huddle of little pintas on the doorstep. Things whizz around, clearing away all the little dead bottles after every coconut is thrown at them. Fine for the first few frames, but wears a little thin after that.

After the bottles have rattled down the drain, the bloke with the strange trousers stops standing on one leg, and teleports himself out of the way. Just in time too, as a flippin' great scoreboard descends from upon high to embarrass you.



The graphics are in four colour mode (raging red, brilliant blue, bright white, boring black), and the area of play is confined to lane five. A strip up the middle, about one fifth of the width of the screen. The inlay claims a perspective view; the coconut gets smaller and speeds up at the half way point.

Up to eight players can whang coconuts at milk-bottles. I can just see them all queueing up for this at a parties, can't you? The 'straddy does the scoring, so at least nobody can cheat. Though sore losers and bored players might just turn the thing off.

Author: US Gold
Price: £8.75

Nigel

There was a time, before software houses discovered that educational software is a total waste of time – if it's bad it doesn't sell and if it's good it gets ripped off – when the grotty programs had a few arithmetic problems thrown in and were sold as being educational.

This reminds me of a typical counting for three-year-olds program. Problem is I doubt any three-year-old has the attention span to wait for the ball to roll the length of the alley.

10/20

Liz

Hype+hype+hype=naff game. I should have known that a photograph of Richard Tisdall grinning inanely while laying in a bowling alley was a prophet of doom aimed at swelling US Gold's boom of profits.

If they stopped spending money on marketing and someone who has to be sent angry letters before he'll send out software then US Gold could invest in some better programmers.

One Gauntlet doesn't make a summer. Bowling is about wearing silly shoes and laughing at friends. I know I'd laugh if any of my friends bought this.

Thinking in terms of value for money the phrase "a waste of blank tape" seems to spring to mind.

1/20

Colin

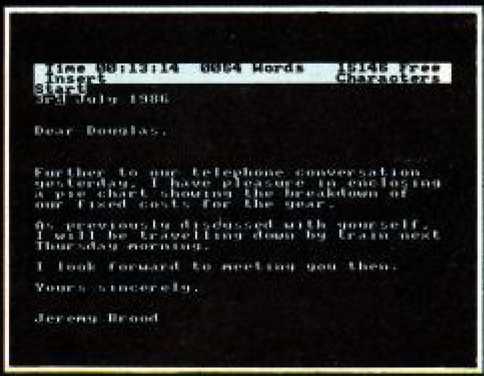
Well, I'll try anything once. And this one is definitely a once only candidate. About all it did for me was to teach me how to keep score at bowling, and how to use the minimum screen area for playing a game in.

Take note, folks, how the word "real" appears within quotes on the inlay. This is what you do if you want to say something that 'aint quite true.

"All American Software." Just goes to show that the Yanks can't write programs to save their American backsides. I'll stick to pool.

6/20

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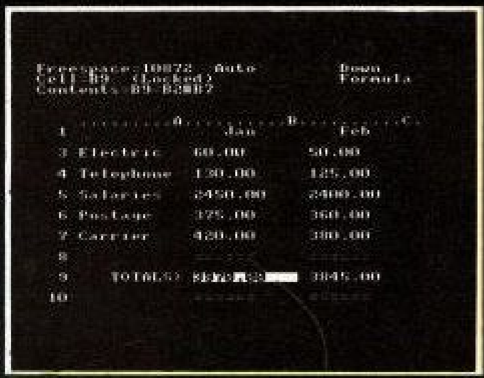
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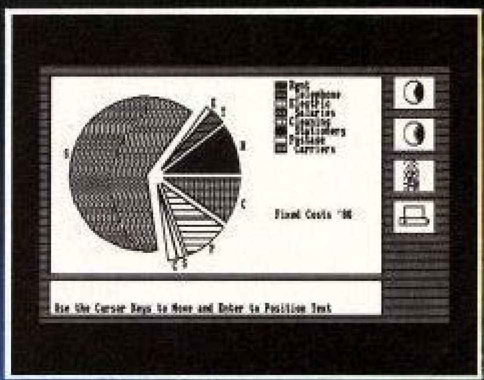
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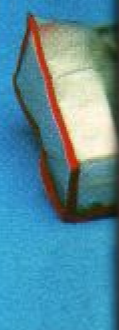
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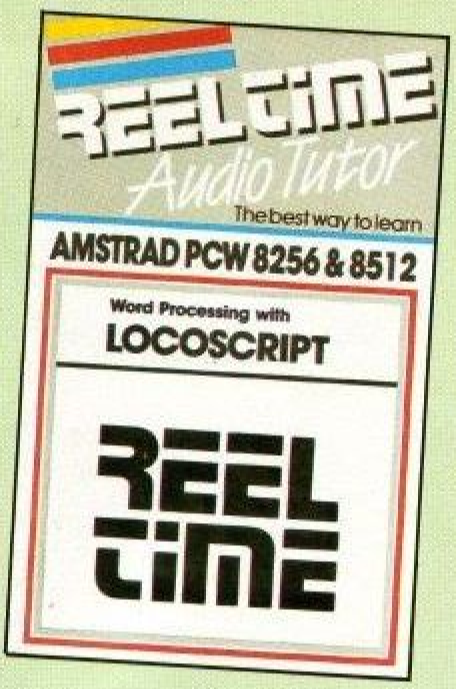
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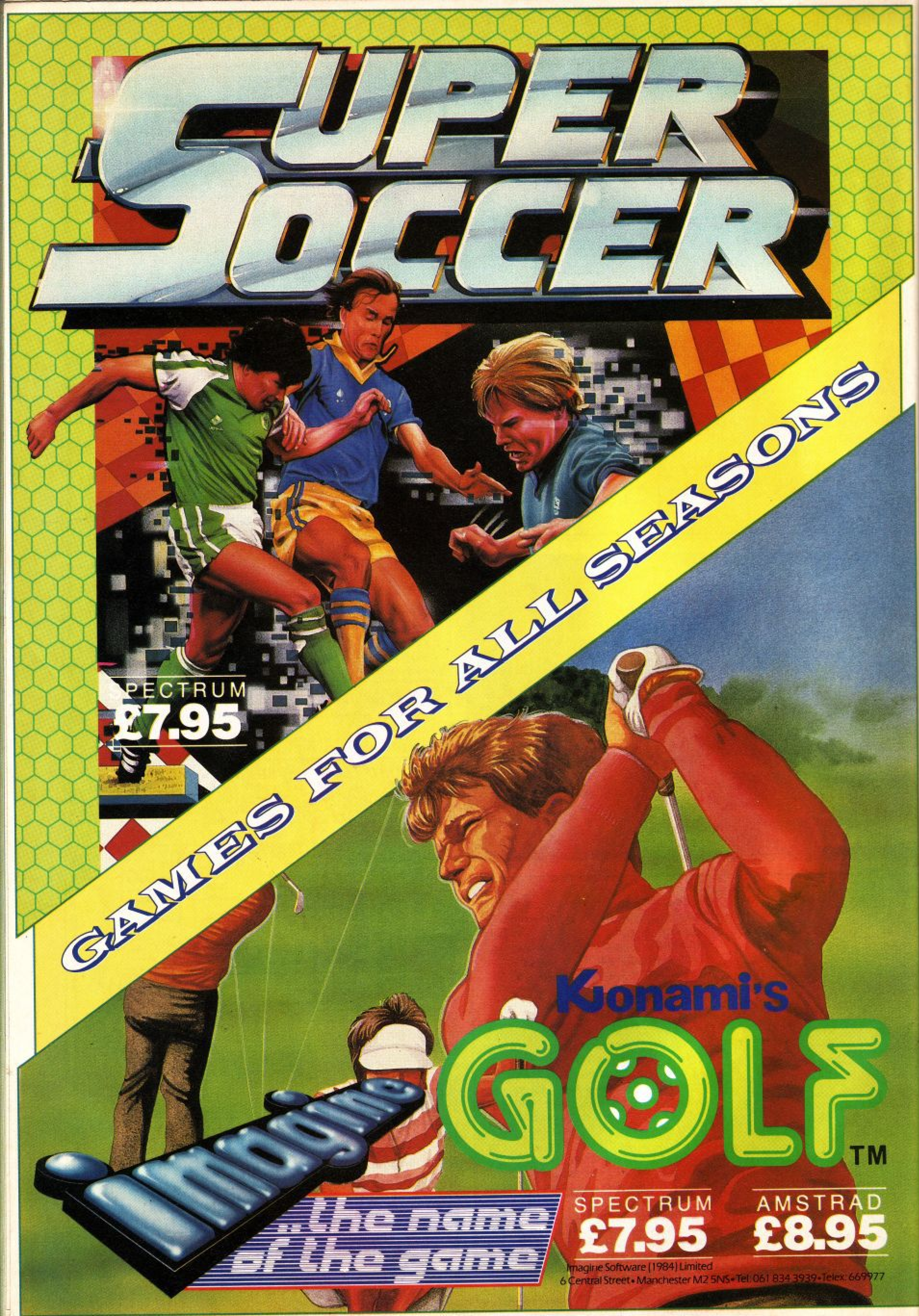
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ZBASIC has been selling like hotcakes in the States and now you can get it in Europe for an amazingly low price, *only from **HiSoft**!*

Its fast, friendly and full of features - Amstrad Computer User, Feb 87

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HiSoft TurboBASIC £14.95/£19.95

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PC1512 Software

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Knife-86 is the most powerful disc-recovery utility available for the Amstrad PC1512 computer. It allows you to examine any disc, floppy or hard, and change the contents of the sectors by simply moving the cursor over the top of the location you want to change. There's a host of features and utilities on the disc including **UNDEL** for recovering accidentally-deleted files, **PAGE** for sophisticated text pagination to printer, **SHOWMAP** to map your disc usage, **GENSUB** for easy generation of batch files and lots more.

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The Least Significant Bit

It is obviously "hip" to go around suing people. The Americans do it all the time, with Atari and Commodore making lots of attorneys extremely rich. Now Amstrad is getting in on the act.

New boy David "Rumpole" Hymes is the company solicitor who – and I take my wage packet in my hands as I write this – goes to court as often as most people change socks.

David, Sir (bow, scrape, please don't sue me, cringe, cringe) is on the warpath. He is on a mission to seek out and destroy any company which has committed the cardinal sin of sounding like Amstrad.

If you have a product with a name starting AMS then you could be in for a very heavy legal letter. Having proved very successful at this he's now looking into people using just the letters AM. All this leaves LSB wondering about a delicacy served at our local, the 'amsandwich.

Mendes leaves

Arnor are not exactly small fry in the Amstrad world. Maxam, Protext and Utopia are roms which no serious Amstrad user should be without. Until recently the marketing man at Arnor was Dave Mendes, a man with the gift of the gab and a talent for programming.

Dave was responsible for the spectacularly unsuccessful Gatecrasher and the spectacularly successful 3D Grand Prix. He has now left Arnor for pastures new leaving Dave Fisk to handle all the marketing type things. And there is a lot planned.

The long-awaited Maxam 2 assembler should answer the critics who are defecting to the likes of Devpac 80 and Laser Genius. Maxam is not the only new product. There will be a version of the C language but there is no sign of the rom-based spreadsheet the Arnold really needs.

They believe

Anyone who has met a little computer person will know how cute, charming and generally human the pixel pixie can appear, but no one actually believes the cock and bull story about a man living in your computer.

Well there does appear to be one group who've fallen for the binary bull. What's worrying is that they are the people who ought to know better. They are the men in Amstrad Technical, the men who as we speak are working on the next generation of Amstrad computers. Will they fit a two and a half storey house as standard? I'd worry.

Next month

Life being what it is, we try to plan ahead. So we have some mega plans for next month. The new Rainbird Art Studio will pass under Jill Lawson's critical gaze, David Foster is looking at the PlanIt package for everyone who isn't yuppie enough to own a filofax, with a bit of luck Justin "Hacker" Garvanovic will have a very special scroll routine and we hope to get our hands on the new Amstrad DMP-4000 printer.

Jerry Muir has been off to Elite so there is no telling what he might come back with. Plus all the regulars.

Oh and Gauntlet fans shouldn't buy the lower levels. Wait till Justin's been at it . . .

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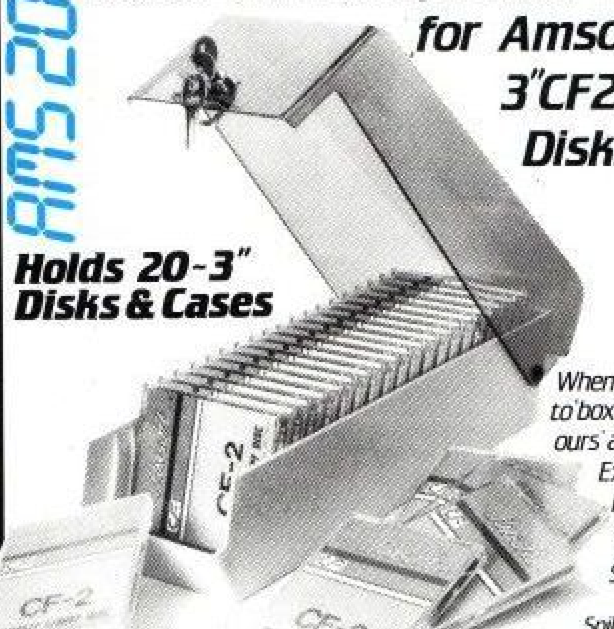


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